THE REFINER AND NATURAL GASOLINE MANUFACTURER

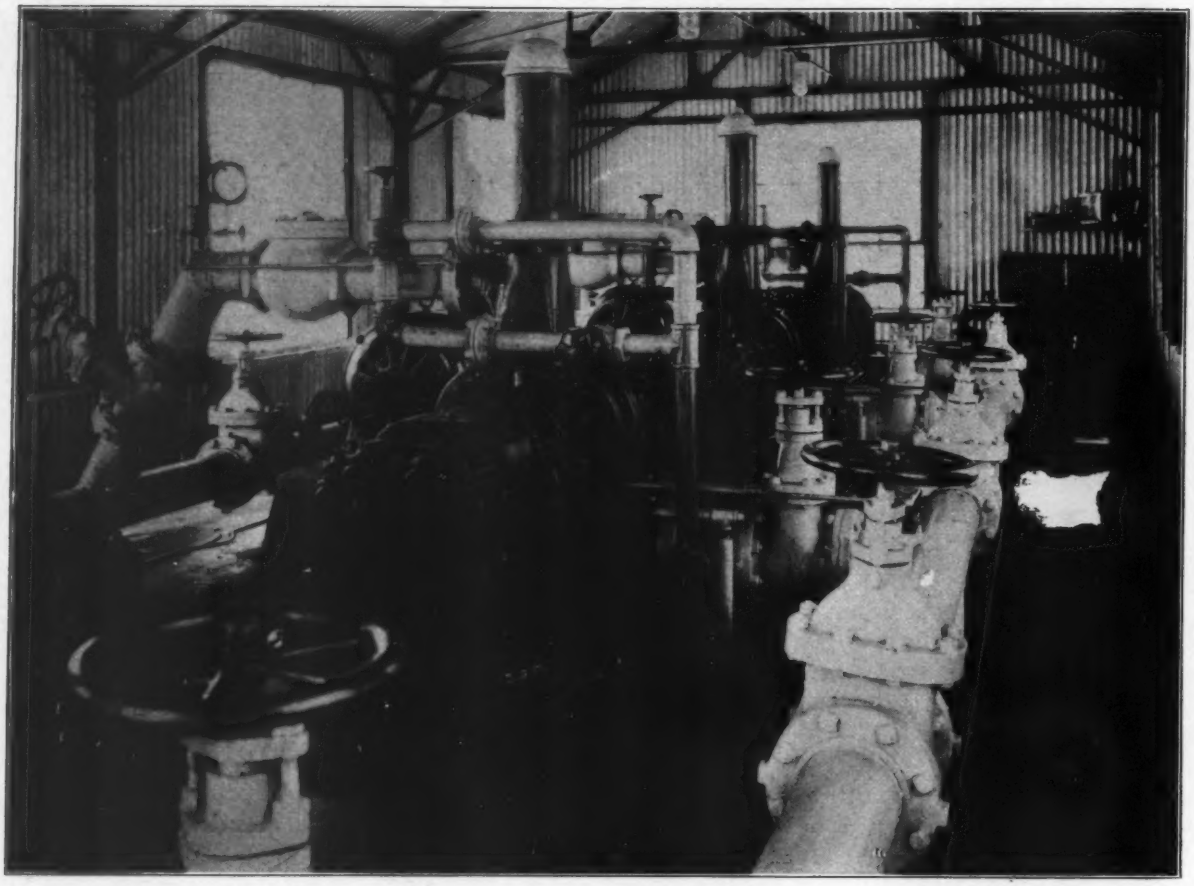
In This Issue

Doing Business on a One Price Basis.
By Grady Triplett
Expander Increases Yield at Pure Oil Plant.
By Rose Mansell
Recovery of Sodium Plumbite and Refining.
No Surplus Equipment Stocks for This Refinery.
By A. R. McTee
Saving Vapor Accomplished with Closed System of Loading. By R. G. Hamaker
The Future of Gasoline. By Everett J. Ford

DEC 12 1925
LIBRARY

Vol. 4 No. 12 DEC., 1925 $1.00 Per Year

AFTER THE LEAVES HAVE FALLEN
Cold weather brings the most exacting tests for motor fuels.
The gasoline that ignites readily and starts the engine quickly and surely, is going to enjoy an overwhelming popularity with the motor public during the winter that is coming.
And NATURAL GASOLINE is the surest and simplest medium for obtaining this grade of sure-fire motor fuel.
The best high-test gasolines have their percentage of NATURAL GASOLINE, to give them the vitality required for good winter performance.
CHESTNUT & SMITH
CORPORATION
TULSA, OKLA.



Roots Rotary Pumps in service at the Skelly gasoline plant, Lyman, Okla.

Roots Pumps Eliminate Shutdowns

All Roots equipment is built to last indefinitely. When necessary Roots Pumps operate 24 hours a day throughout the year. Adjustments can be made while pump is operating.

We know of one gas pump that operated 8 years without a forced shutdown. It was then taken down to remove the sulphur.

Sturdy construction, absence of small parts and contact surfaces, elimination of internal lubrication makes this long life possible.

You have only to buy one Roots Pump—they last a lifetime.

Write for Bulletin No. 113

ROOTS

You should have the following bulletins in your files:

113—Roots Rotary Pumps.

108—Roots Rotary Gas Pumps.

111—Roots Positive Displacement Gas Meters.

118—Engineering Tables.

Just ask the nearest office for them.

The P.H.& F.M. ROOTS CO.

DEPT. 10

CONNERSVILLE, IND.

Chicago Office
130 S. Michigan Ave.

New York Office
Room 800-120 Liberty St.

1576 Union Trust Bldg., Cleveland

Entered as second class matter June 16th, 1923, at the Postoffice at Houston, Texas, under the Act of March 3, 1879.

Here's What Happens When Rust Gets A Chance

(245)

A tank roof honeycombed with rust holes—evaporation losses many times multiplied—early repairs, if not a gauger drowned, or replacement of the entire roof.

That's why you should paint the underside of your tank roofs.

Back of Degraco Tank Paints stands the integrity of the maker—thirty-five years of close contact with paint problems. A definite knowledge of the service conditions to be met and how to meet them are the basic reasons for their wide and successful use in the oil industry.

You can bank on Degraco Paints to cut down corrosion losses.

DEGRACO PAINTS

All Colors for Your Particular Needs

MADE BY

Detroit Graphite Company

512 Twelfth Street

DETROIT U.S.A.

NEW YORK	TAMPICO	PITTSBURGH
CHICAGO	HOUSTON	LOS ANGELES
TULSA	KANSOS CITY	PORTLAND
ST. LOUIS	PHILADELPHIA	SEATTLE
SAN FRANCISCO		

Name_____
Position_____
Company Name_____
Address_____
State_____
Detroit Graphite Co.
512-12th. St.
Detroit, Mich.

DEGRACO PAINTS ARE SOLD THROUGH BRANCH OFFICES WITH WAREHOUSE STOCKS IN ALL PRINCIPAL CITIES

MANUFACTURED IN CANADA BY DOMINION PAINT WORKS, LIMITED, WALKERVILLE, CANADA

MATHIESON Chemicals

Reduce Operating Costs By Using Liquid Caustic Soda

ECONOMISTS warn that an era of keenest competition is at hand, in which profits will accrue to those manufacturers able to eliminate waste and cut production costs to a minimum.

We have long emphasized the economy of Liqud Caustic Soda in tank cars for large consumers having siding facilities and a favorable freight rate from a source of supply. Consider the needless waste involved in the following operations:

Caustic Soda, when first manufactured, consists of a solution containing 75% or more of water. To furnish solid caustic, fuel must be consumed to drive off all this water, drums must be provided as containers and labor expended in filling and handling the drums. At the consumer's plant the operations are reversed; the solid caustic is made once more into a water solution, at considerable cost for handling and cutting open many drums, dissolving the solid caustic and disposing of the worthless empty drums.

The use of Liquid Caustic Soda eliminates this needless expense at both ends. The consumer effects a material reduction in operating costs and our saving in production costs is reflected in a lower price per hundred pounds on Mathieson Caustic Soda in liquid form.

Mathieson Liquid Caustic Soda is supplied from Niagara Falls, and Saltville, Va., in a 50% solution containing equal parts of water and solid caustic soda. Our technical staff will be glad to assist consumers interested in these economies.

The MATHIESON ALKALI WORKS *Inc.*
250 PARK AVE. NEW YORK CITY
PHILADELPHIA CHICAGO PROVIDENCE CHARLOTTE

Caustic Soda ~ Liquid Chlorine
Bicarbonate of Soda
Anhydrous Ammonia

Soda Ash ~ Bleaching Powder
Modified Virginia Soda
Aqua Ammonia

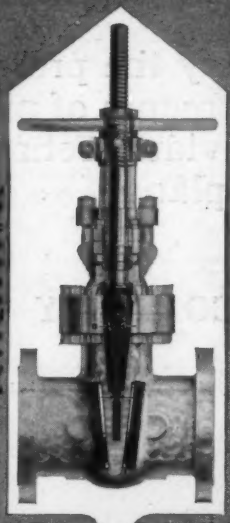
Deal Direct with the Manufacturer

Tell them where you saw the ad

The Disc can't wobble—

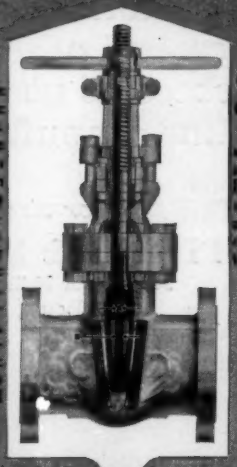
IN THE NEW DESIGNS OF LUNKENHEIMER

IRON BODY GATE VALVES



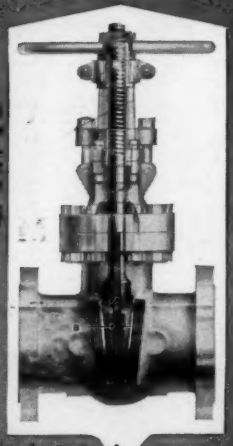
Valve Wide Open

Machined Guides are used in all sizes of Lunkenheimer Gate Valves, including the Standard as well as the Heavy and Extra Heavy Patterns. The ribs (A) in body and grooves (B) in disc are accurately machined, and are fully engaged even with valve wide open.



Valve Almost Closed

At this point the tendency for the disc to wobble increases. No wobbling in the Lunkenheimer design—clearance between ribs (A) and grooves (B) is so small and accurately gauged that pressure from either side cannot force disc against opposite seat. Thrust of disc is always against guides, and not against seating surfaces. Disc cannot drag on seats or touch them until valve is closed.



Valve Closes Tightly

And the ribs (A) and grooves (B) are still fully engaged. Disc rides straight and true to its seat and closes instantly, completely cutting off the flow.

Above views illustrate how disc is guided in its travel, and show why disc cannot drag on seats or touch them until valve is closed.

Other Outstanding Features

Face to Face Dimensions — Standard Trade Practice.

Heavy Bronze Seat Rings. Rings seat against solid walls of valve body—do not depend on a small flange to effect a joint with body.

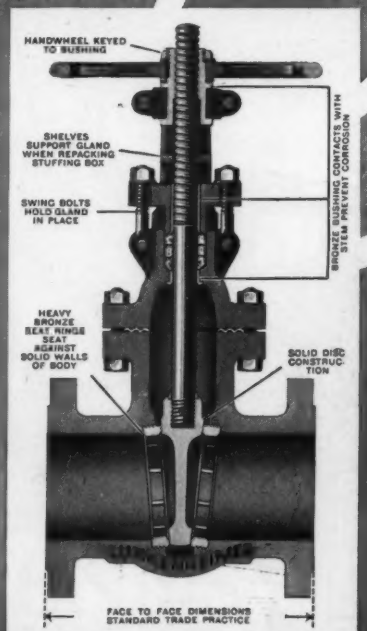
Solid Bronze Disc in sizes up to 6-inch; iron disc with bronze faces in 7-inch and larger sizes.

Bronze Bushing Contacts with Stem through yoke, gland and stuffing box prevent corrodible contact with iron parts of valve.

Swing Bolts hold gland in place; entire removal of nuts unnecessary to raise gland.

Two Shelves cast within yoke arms support gland when repacking stuffing box.

Interchangeability in the highest degree has been attained. All parts are renewable, including the seats and disc. Any replacement part will be exactly the same size as that which is to be renewed.


HANDWHEEL KEYED TO BUSHING
SHELVES SUPPORT GLAND WHEN REPACKING STUFFING BOX
SWING BOLTS HOLD GLAND IN PLACE
BRONZE BUSHING CONTACTS WITH STEM PREVENT CORROSION
HEAVY BRONZE SEAT RINGS SEAT AGAINST SOLID WALLS OF BODY
SOLID DISC CONSTRUCTION
FACE TO FACE DIMENSIONS STANDARD TRADE PRACTICE

Lunkenheimer Iron Body Gate Valves are made in the Standard Pattern, 125 lb. W.S.P. 2 to 24 in.; Heavy, 175 lb. W.S.P. 2 to 16 in.; Extra Heavy, 250 lb. W.S.P. 1½ to 18 in.

Correct design, careful selection of materials and skilled workmanship combine to produce this, the highest development in gate valve construction.

Distributors in all commercial centers carry Lunkenheimer products in stock and render prompt service.

THE LUNKENHEIMER CO.

—"QUALITY"—

CINCINNATI, OHIO, U. S. A.

NEW YORK CHICAGO BOSTON LONDON

EXPORT DEPT. 129-135 LAFAYETTE ST., NEW YORK

Fill in and mail the coupon for a copy of the new Gate Valve Booklet. It will be sent without obligation.

THE LUNKENHEIMER CO. P. O. Box 676 Cincinnati, Ohio.

Please send me without obligation, copy of the new Gate Valve Booklet. HJ

Name.....

Firm.....

Address.....

600-38-89

Tell them where you saw the ad.

MIDWEST Piping

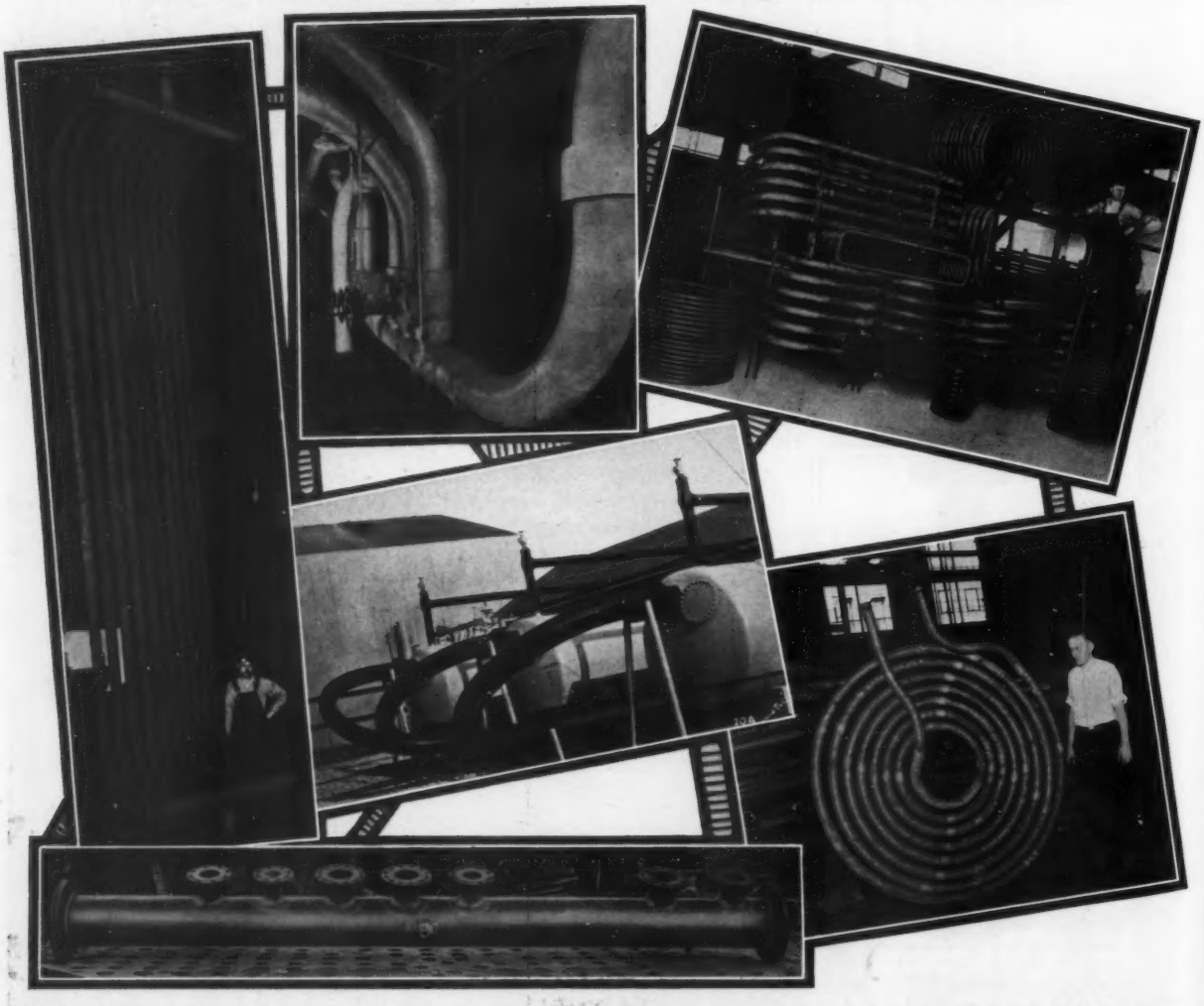
Midwest Piping is fabricated to satisfy the pressure, temperature, space and other requirements of piping for the various processes used in individual refineries and natural gasoline manufacturing plants.

Ask for circular O-1

MIDWEST PIPING & SUPPLY COMPANY

Second and Miller Streets
St. Louis, Mo.

Tulsa Office: 805 Mayo Building. Chicago Office: 208 So. La Salle St.



Tell them where you saw the ad

Now you can get better boiler and tank flanges!

YOU'VE been waiting for flanges like these. Most oil refiners have—as shown by repeated inquiries. Pennsylvania Forge Co. precision and fine workmanship in every detail. Threads gauged to Briggs Standards. No ragged or variable threads on Pennsylvania Forged Steel Flanges. Starting thread protected by chamfer. Edge beveled exactly right for caulking. Soft, open-hearth steel, easily punched for rivets. Boiler and tank flanges like this make for increased production and lower operating expense.

Flat or bent to standard circles. Write for prices.

Forged Steel Pipe Flanges

Insure perfectly sealed joints. Square edges; square corners; accurate Briggs Standard threads. Carefully machined. Use them on the gathering lines, as well as on stills and high temperature lines. Cost less in long run than cast-iron. Write today for tables of A.S.M.E. standards in handy form, with prices on each size.

PENNSYLVANIA FORGE CO.

PHILADELPHIA

Tell them where you saw the ad.

Cracked Gasoline Knoxless-Pullsmore

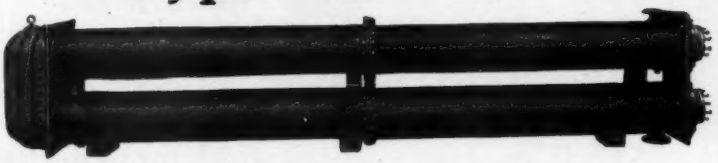
To appreciate the reason why cracked gasoline is a better motor fuel than straight run gasoline you must understand the fundamental difference between distillation and cracking

Distillation is merely the physical separation of low boiling hydrocarbons (gasoline) from the heavier, high boiling hydrocarbons But cracking is actually a *chemical conversion* of oil, containing no gasoline, into gasoline of the unsaturated, aromatic, napthene and paraffin hydrocarbon series And the unsaturated, aromatic, and napthene hydrocarbons are the primary elements which give cracked gasoline anti-knock properties which no ordinary straight run gasoline, from paraffin or semi-asphaltic base crude, possesses

Cracked gasoline is a premium gasoline worth a premium price

Universal Oil Products Company
Owners of the Dubbs Process
310 South Michigan Ave
Chicago, Illinois

For Efficient Heat Exchange in Absorption Type Gasoline Plants



The G-R Mineral Seal Oil Heat Exchanger

is designed so that the saturated and unsaturated oils flow through the heater in opposite directions, resulting in maximum rate of heat exchange.

There are several other practical service advantages that also help to explain the rapidly increasing popularity of this exchanger. Because of its twin arrangement, it is exceptionally compact and easy to inspect, clean, and transport to new locations if desired. All oil connections are at the same end to simplify piping. The construction eliminates expansion strains and likelihood of leakage or breakage.

These advantages and the features of construction of the G-R Mineral Seal Oil Heat Exchanger are explained in Form 207, which will be sent on request.

Send the coupon today

THE GRISCOM-RUSSELL COMPANY
2135 West Street Building, New York

Philadelphia	Chicago	St. Louis	San Francisco
Boston	Cleveland	Kansas City	Los Angeles
Rochester	Detroit	Charlotte	Seattle
Pittsburgh	Milwaukee	New Orleans	Denver
Columbus	Indianapolis	Houston	Salt Lake City
	Minneapolis	Dallas	Tulsa

For Canada: Riley Engineering and Supply Company, Ltd., Toronto

Griscom-Russell

Heat Transfer Apparatus

Note these other G-R Units for lower refining costs.

G-R Sectional Condenser

for condensing hydrocarbon vapors and other vapors

Can be used either as a standard or reflux condenser. The sectional arrangement permits using as a condenser and heat exchanger in one set or to obtain a different cut from each section.

G-R Vaneflo Gas Cooler

for cooling casinghead or natural gas

Can be used as inter-, after-, or pre-cooler in absorption and compression type natural gasoline plants. Has low pressure loss and exceptional efficiency.

G-R Jacket Water Cooler

uses any source of raw water to cool the jacket water from oil and gas engines and compressors.

The famous Multiwhirl Cooler—over 2000 in operation in every liquid cooling service.

G-R Gasoline Condenser

for condensing natural gasoline vapors in casinghead gasoline plants

Can also be used as a knockout box or fractionating tower control section with particularly close control of the end points.

G-R Twin Heat Exchanger

For the efficient interchange of heat between crude oil feed stock and still bottoms, cold water and hot oil, feed stock and hot still vapors, etc.

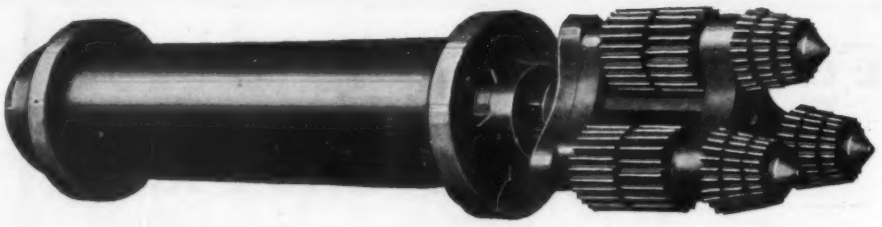
The Griscom-Russell Company.
2135 West Street Bldg., New York.
Please send information on

- ☐ Gasoline Condenser
- ☐ Sectional Condenser
- ☐ Mineral Seal Oil Heat Exchanger
- ☐ Vaneflo Gas Cooler
- ☐ Jacket Water Cooler
- ☐ Twin Heat Exchanger

Name . . . . . .

Address . . . . . .

M-12-25



In pressure stills, cleanliness means efficiency

THE hard coke deposit which forms in Pressure Still tubes is disastrous to economy. It is easy to understand how this heat insulating layer affects the transfer of heat through the tube walls. Oil Refinery men have found it necessary to clean tubes after each run.

For this service, Liberty Cleaners have been eminently successful. The Tandem type motor, using the rugged and simple type "SF" Head (illustrated above) has been specially designed with the needs of the Oil Refinery in mind. This tool gives fast, durable service, with extremely low maintenance cost. It is the right tool for this work.

Use Liberty cleaners also, in cracking coils, tar lines, boilers, pipes, etc.

Write for our Catalog Z-2, and information regarding cleaners for your particular service.

Liberty Manufacturing Company

449 Grant Street **Pittsburgh, Pa.**

LIBERTY CLEANERS

"Spare the cleaner and spoil the tubes"

Tell them where you saw the ad.

At Last—a Look Box

—that really shows the stream

—no more breakage from temperature strains

The Oceco Look Box

The complete cylinder of Pyrex glass gets away from the old breakage troubles.

HERE'S a practical, efficient method of controlling the operation of your stills—the Oceco Look Box.

Also, it's good looking, thoroughly modern and will add to the appearance of your receiving house which, after all, is really the show spot of the refinery.

Note its clean-cut appearance and how the complete cylinder of tough Pyrex glass gives an entirely unobstructed view of the stream entering through a V notch weir.

Ready access to the box is provided through a five-inch hand hole, fitted with a gas-tight aluminum cover. The casing is tapped for a sample cock in the bottom, and two-inch gas line in the top.

A thoroughly efficient unit easily installed. Studs are for standard four-inch companion flanges with the same center to center distances as found in the majority of receiving houses now using the old type look box.

Let us quote you on your requirements.

OCECO EQUIPMENT

- Roof Manheads
- Gauge and Thief Hatches
- Gauge Wells
- Safety Tank Winches
- Cable Sheave Brackets
- Swing Joints
- Steel Tank Nozzles
- Automatic Tank Gauges
- Breather Valves
- Flame Arrestors
- Automatic Tar Plugs
- Oil Still Safety Valves
- Receiving House Look Boxes
- Automatic Extinguishers for Agitators
- Fire Extinguishers

THE OIL CONSERVATION ENGINEERING COMPANY

877 Addison Road — *Headquarters for Tank Equipment* — Cleveland, Ohio

25 Broadway, New York — O-S Building, Casper, Wyo. — 440 Howard St., San Francisco, Cal. — Beaumont Export & Import Co., Beaumont, Texas, and Tampico, Mex.
325 Iowa Bldg., Tulsa, Okla. — 318 East 12th St., Los Angeles, Cal. — W. K. Henderson Co., Shreveport, La.

OIL TANK OCECO EQUIPMENT
SAVES EVAPORATION AND PREVENTS FIRE

Tell them where you saw the ad

Tell them where you saw the ad.

Editorial Office:
215-16 Atco Building
Tulsa, Oklahoma

Publication Office:
1716 Dallas Avenue
Houston, Texas

Offices:
2002-350 Madison Ave.,
New York
453 First Nat'l Bank Bldg.,
Chicago
1201 Haas Building
Los Angeles
212 W. T. Waggoner Bldg.,
Fort Worth

The REFINER
and NATURAL GASOLINE MANUFACTURER
EDITED MONTHLY AT TULSA, OKLAHOMA
GRADY TRIPLETT, *Editor*
Published by
GULF PUBLISHING COMPANY
HOUSTON, TEXAS
R. L. DUDLEY, *President* A. L. BURNS, *Gen'l Mgr.*
Volume 4 DECEMBER Number 12

For men engaged in the operating branch of the refining and natural gasoline business

Price.....$1 per year

Advertising rates upon application to nearest office

Copyrighted by the Gulf Publishing Co., 1925

Why Jobbers Would Build a Modern Refinery

An address by H. F. Brownell of Sioux Falls, S. D., before the Nebraska Independent Oil Men's Association

"COMING to the question of the refinery which the jobbers are proposing to build and operate for themselves, we have found various objections and criticisms. We are told by some of the refiners that there is no reason for the project because there is even now too great a refining capacity. We are told that it is not feasible because, as jobbers, we are not in a position to know how to operate a refinery, and we are criticized for the plan chiefly on two grounds:

"One, that, while we object to the refiners building filling stations and duplicating our distribution, we are perfectly willing ourselves to duplicate their plants; and second, they criticise us because we propose to take gas oil, which, they claim, and I guess rightly, is a by-product and sold by them at a loss and convert it into gasoline, when there is already too much gasoline on hand and promises to continue to be too much for the public to consume.

"The refiners who offer these criticisms are either those who now operate large skimming plants and cannot or will not modernize these plants to enable them to produce gasoline as cheaply as their competitors, or they already operate a fine, modern, cracking plant and are benefiting greatly because of the wide spread between the price which we, as jobbers, are obliged to pay the skimming plant and the price at which they can produce gasoline.

Refiners' Criticisms

"In the first instance they are unwise in their attitude and unmindful of their own future. In the second place they are unfair, or perhaps I should say they are mindful only of the profits which they enjoy from the present conditions and do not wish to see the situation disturbed—a situation which has enabled them to make more than a reasonable profit when the refiners who could not modernize their plants hang on by an eyelash and when the jobber, who buys from the skimming plant at a high price and sells on a market fixed for him by his chief competitor, finds himself where he can scarcely make a living and has even been forced to choose between selling his plant to a big competitor or going out of business altogether.

"And I make the remark here that we had better not shut our eyes to the fact that many more of us may have to sell out to the big competitor or close our plants. And I think I may also add that if we continue to allow the present situation to exist without making an effort to control or change it the selling or the closing of our plants will be only a just compensation for our failure to face facts, to think clearly and act intelligently.

"Now as to the suggestion that there is no reason for our building and operating a big refinery because the refining facilities are at present overdone, I wish to point out that, while refining facilities are plainly overdone, yet modern facilities which will enable the refiner to produce gasoline at the lowest possible cost are not overdone, except in the sense that the big refiner who has a modern plant can produce gasoline enough to supply the demand. In this respect the facilities are adequate, but so far as present facilities furnishing a dependable source of supply for jobbers and that at a price that will be competitive, it is a nearly hopeless outlook. And to say that there is no reason for jobbers not taking this step to provide themselves with a source of supply at a price which will enable them to compete with a big refiner who operates in their territory, is a specious sort of reasoning.

The Marketers' Problem

"I said at a recent meeting of the National Petroleum Marketers' Association that the great problem confronting us at that time was to secure a constant and dependable source of supply at a competitive price. I did not mean that there was not gasoline enough, or that there was any indication that there would not be enough in the future. My idea was that while there would be an ample supply of gasoline it would be in the hands of a few people, who were able to produce it in large quantities and produce it at a lower price.

"I still maintain that in spite of the great flood of gasoline there is not in

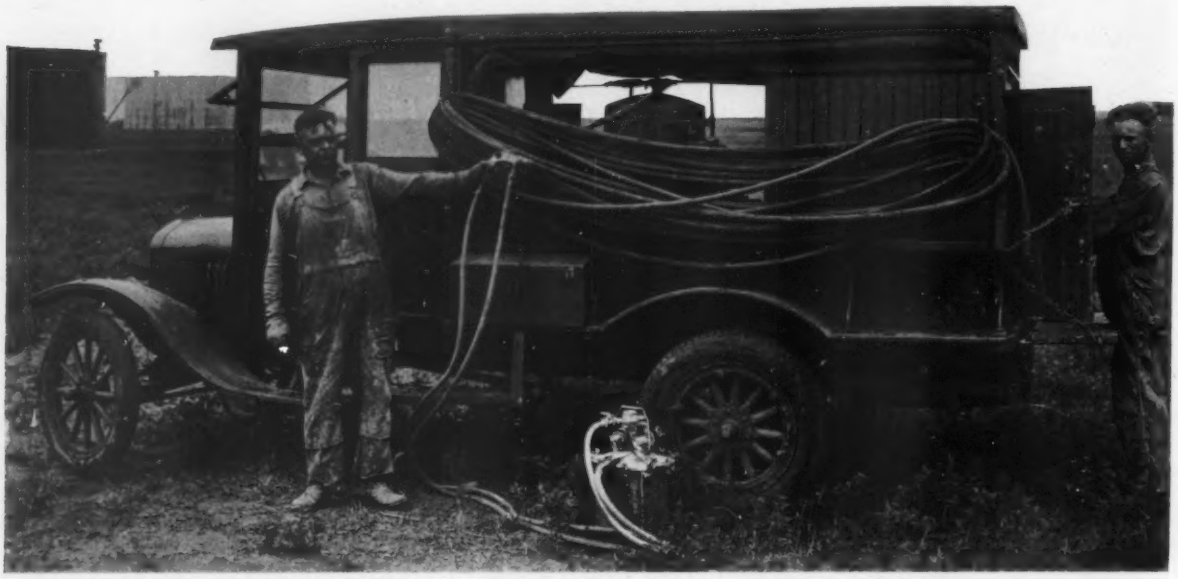
(Continued on page 42)

AS OTHERS SEE HIM

The refiner has his own picture of himself as a business man. He is opposed to the proposed plan of the National Petroleum Marketers Association to foster the building of a refinery, equipped to crack gasoline from gas oil.

It may be well for the refiner to see himself as the jobber does. So here is the picture, drawn by a member of the committee considering the refinery, H. F. Brownell of the Brownell Corporation, Sioux Falls, S. D.

—The Editor



Reduces Painting Costs!

Matthews Mechanical Painting Equipment will do the work of a gang of four to eight brush painters—and do better work at that! A 55,000 barrel tank which requires approximately eight man days by hand, can be painted in eleven man **hours** mechanically.

Many oil companies are now using Matthews Equipment to lower their maintenance painting costs. Tanks, bulk stations, refineries, tank cars, buildings, etc., can be painted much more quickly and at a lower final cost by this method.

Every type of equipment to meet the need of the oil fields is included in the Matthews line, from the motor truck mounted outfit (shown above) for use around tank farms, to the pint size jar type for stenciling.

Painted Mechanically

This entire job, including under coat, aluminum coat, running gear, and stenciling, was painted with Matthews Equipment.

Write for your copy of

"Mechanical Painting for Industrial Maintenance"

W. N. Matthews Corporation

3708 Forest Park Blvd., St. Louis, U. S. A.

MATTHEWS MECHANICAL PAINTING EQUIPMENT

Tell them where you saw the ad.

The Future of Gasoline

Blends with alcohol offer possibilities for refiner to study

By Everett J. Ford
Department of Chemistry, Boston College

IT IS A FACT worthy of note and provocative of thought that within the memory of all of us, gasoline found no outlet as a commodity of commerce and was looked upon as a by-product of doubtful value and sometimes even as a "nuisance." The "naphtha" of the refiner did find limited applications, but few there were, if any, who could foresee the future of the then too abundant by-product.

So it happens in our modern economical development that very often the by-product becomes the chief product, and others are relegated to secondary consideration. All commodities of whatever present importance and value are in the ultimate analysis variables, subject to the influence of a large variety of economic factors.

Well may we ask, then, if a quarter of a century has wrought such remarkable innovations, what does the future hold in store for us?

It is not only possible, but highly probable that another decade may herald the advent of even more remarkable changes with simliar upheavals in the relative values of commodities.

Automobile Responsible

It is doubtful that the commercial adoption of the stationary gas engine increased to any extent the market for naphtha. The normal increase in the demand for the heavier distillates such as kerosene provided adequately for the new consumption of naphtha by the gas engine. The sudden change in the status of gasoline as a commodity was brought about by the development and universal adoption of the automobile.

The growth of the automobile as a transportation agent is too familiar to all of us to merit extensive consideration here. Suffice it to say that year after year the gasoline manufacturers were being progressively pressed to construct larger and larger distilleries to produce the maximum output of naphtha. New sources of raw material were sought and every energy was applied to meet the situation. All other products became of minor importance.

Our modern economic development seems to be placing an ever-increasing strain on the gasoline manufacturer and his available resources. The insistent demand springs continually from every department of the industrial and economic phases of our national life. Farmers have replaced animal power with motor facilities for planting and harvesting their crops. Railroad transportation is threatened by the amazing development of what appears to be a more desirable and economical motor transportation system both for passengers and freight. Busses carrying passengers on long and short hauls have increased a thousand fold in number during the last year. Long distance motor truck lines are ever on the increase both in number and ton capacities. The use of passenger cars for pleasure has advanced in leaps and bounds. The toiler who at one time used the trolley lines in going to and from his work now uses his automobile.

This recital is not intended as an indictment of railroad transportation facilities. It is merely a statement of facts. Railroad transportation is not adequate. In some cases it lacks flexibility. Intercourse between cities and towns demands a flexible and universal service which the railroads can not supply. The desirability of motor busses for passenger transportation over the best that railroads can offer is well proven by the rapid development of these projects. The comfort they afford is in some cases as good as that provided by a railroad parlor car; the travelling time compares favorably; and other factors such as safety, enjoyment of scenery, stop-over privileges, etc., have all been found to enhance the value of this mode of travel.

Now the Airplane

We might proceed at length to discuss these developments in the applications of the automobile to modern social economy and the subsequent demands of gasoline supplies as fuel. Suffice it to say, that automobile registrations in all the states are the signs of the times and will provoke the thinking man to consider the future.

There is another neophyte in the transportation field with its ever-growing demand for a superior grade of gasoline—the airplane. In these days of daily transcontinental air flights and recrod-breaking trips, hardly a neck is craned to observe the passage of an airplane. In spite of the fact that aerial transportation is relatively new to us, developments in recent years, and in particular since the late war, have been so rapid that the novelty has worn off and the airplane has taken its place in our matter-of-fact routine.

What is in store for us in the way of aerial transportation may be more than a matter of conjecture. No one knows to what extent air travel may be developed. But it does not seem phantastic to say that before our ever-present problem of automobile traffic is solved we may be faced with the development of a more serious congestion of the air.

Still More Fuel

Coming events cast their shadows. Several buildings which are now in the process of construction are to be provided with roofs suitable for the landing and "parking" of airplanes. It is significant that a large New York department store now carries in its stock a small aeroplane selling at a relatively nominal price. Who knows but that in a decade or so the average business man may be able to navigate at his pleasure with a small aeroplane. Probably even more likely is the possibility of larger planes or small dirigibles for interurban transportation. No one will deny that the day of long-distance air travel is fast approaching.

Such statements as these may provoke ridicule or at least be considered by some as farfetched and impracticable. But the possibilities of the future are unlimited and only a fool or an ignorant person will deny the possibility. The probability may not be questioned.

In the interim, what of gasoline? With the rapid and enormous increase of the market and almost frantic demands for more naphtha, the refiner has been sorely put to it. In the early stages of the movement, it was only necessary to turn over the ill-reputed naphtha to supply the new market.

With further developments the refiner was required to make naphtha his chief product and consider other products as of subsidiary importance. As years rolled by and with them more automobiles, new fields were sought, more wells sunk, and larger plants built to meet the demands of the consumer.

The question now arises—what is the relation between the possible future demand and our present crude petroleum reserves? What developments are we due to witness in the gas-consuming economy of the nation?

Forecasts Too Low

Whatever estimate may be made regarding the future ratio between supply and demand, past experience has

shown that average forecasts are hardly likely to be exaggerated.

Early forecasts relative to the possible limit of our reserves have in all cases been proven inadequate with the passing of a few years. Most of them, while made in all sincerity, are ridiculously low. Yet it is well to note that while estimators have failed correctly to evaluate future supplies they have also underestimated the rapid increase in demand. This fact is indeed significant.

The recent estimate of the Federal Oil Conservation Board is reliable and conservative. The committee of eleven sent out by the board concludes:

1. There is no immediate danger of the exhaustion of the petroleum resources of the United States.

2. It is reasonable to assume that a sufficient supply of oil will be available for national defense and for essential uses in the United States beyond the time when science will limit the demand by development of more efficient uses or substitutes for oil, or will displace its use as a source of power by harnessing natural energy.

Contrasting Opinions

This report is optimistic, yet perhaps conservatively so. It is probably not too much to expect that the future holds in store many surprises in power development which may draw on sources radically different from present-day supplies.

The opinion of the committee of eleven strikes a remarkable contrast with the estimates of skeptics who have broadcasted the statement that unless something is done to reduce the increasing demands, the oil fields will be exhausted in this country at some time in the vicinity of 1935.

Between the skeptics and the more optimistic individuals who aver that the supply is practically unlimited, we find another group of sane-minded critics who realize the possibility of exhausting the supply at some remote future time and who advocate research work for the development of processes whereby the supply can be to some extent at least conserved. A variety of suggestions are offered, such as more economical methods of extraction, the development of newer products, the education of the consumer in the ways of getting the most out of his fuel, etc.

Research along these lines has met with varied degrees of success in the several fields. The development of cracking processes whereby the heavier petroleum distillates and residues are converted into lighter oils by the application of heat or electrical energy is an example. New cracking processes are continuously being developed and appear in the patent literature at a steady and ever-increasing rate.

Yet the cracking of oils to produce "light stuff" is carried on at the present time to the probable limit, at least in view of the fact that the oils themselves are meeting an increasing demand as fuels.

Cracking Has Limits

Furthermore, while the best cracking processes produce a gasoline with a minimum percentage of unsaturated hydrocarbons, nevertheless, this synthetic gasoline, if it may be so called, is hardly on a par with the "naphtha" of twenty years ago.

But granted that the cracking processes should become so well developed that a good naphtha could be economically obtained from the heavier oils, this source is necessarily limited because of recent increasing demands for the uncracked heavy oils.

Oil as a substitute for coal is rapidly gaining ground. The greater desirability of the liquid fuel has lent momentum to a steadily increasing demand for the product. And what with labor troubles and other difficulties at-

(Continued on page 62.)

Refining Should Be Intelligently Controlled

By Joseph E. Pogue

THE time has come when the petroleum industry should give serious consideration to means whereby its collective refinery operations can be conducted in a reasonable manner. It is worse than folly to go into the new year with the way wide open to a repetition of the mistakes that have been an annual incident in the past half decade. There may be some excuse for producing too much crude oil, in view of the competitive drilling that seems almost inevitable in our oil fields, but refinery through-put is subject to intelligent control and there are no extenuating cricumstances when refiners over-produce.

It seems incredible, even in retrospect, that a year of such potentialities as 1925, with a 20 per cent increase in the demand for gasoline, should have been marred by a refinery expansion that exceeded all bounds. Such profits as accrued this year —and it was a not unprofitable period to producers—were the result of the kindness of nature in failing to provide the one more pool required to bring collapse to the crude oil market; the gain is not to be attributed to foresight in planning and conservatism in operation in the refining department of the industry.

What do the records tell? In terms of a calculated normal for each month, refinery operations in the United States have run as follows:

	Percent.
January	110.9
February	110.4
March	111.8
April	111.4
May	111.7
June	118.0
July	118.9
August	115.9
September	108.8

It is evident from the above simple tabulation that refinery markets were over-supplied throughout the early months of the year and seriously congested during the summer. In September, furthermore, there was a radical reduction in operations, which has been carried to further lengths since that month. It is to this curtailment that we owe the improvement in market tone that has recently come into evidence, and upon the continuation of which the hope of the immediate future hangs.

The year 1925 thus forms a perfect example of how the petroleum industry can get into trouble and how it can get out of it. Uncontrolled refinery operations led to over-production, which made low prices inevitable; restricted operations later began to correct the situation and we are now at the turning point. Will the industry pursue the right course until sound market recovery shall have been attained? And with recovery, will a profitable status be maintained?

To help move forward along constructive lines, two things are needed. First, a general appreciation and understanding that refinery operations must be held within the bounds of what the markets will absorb. Second, the means for knowing promptly and definitely when refinery operations are getting out of bounds. The first, let us hope, experience has already taught us. If not, surely another year or two of depressed prices will supply the deficiency. The second is non-existent. As the matter now stands, the industry, whatever its intentions, has no adequate means of controlling refinery operations. Government statistics are too delayed to serve as a guide. The trouble has been caused when those figures become available. What is required is a weekly statistical record of the collective volume of crude oil charged to stills, gathered by telegraph and promptly disseminated.

Shall the industry run the risk of a depression in 1926 for the lack of this simple index?

Expander Increases Yield at Pure Oil Plant at Depew

Equipment operates at low cost by use of dry gas leaving high pressure accumulator tank

By Roye Munsell
Staff Representative

THE methods of increasing the yield of gasoline from compression plants by the use of a lower temperature than that obtained by water cooled coils have had only a limited application because under such a condition the weathering losses were found excessive. When extremely low temperatures are employed such very light (or permanent) gases as propane and butane are temporarily condensed along with the gasoline vapors so that when the product is reduced to atmospheric pressure and a normal temperature they carry off mechanically during their rapid evaporation a considerable part of the stable gasoline.

With the improved methods of blending to build down the vapor pressure and the recent stabilizer, however, the possibilities of using artificial cooling to increase the efficiency of a compression-cooling natural gasoline plant are not at all unpractical.

Pure Oil Method

The Pure Oil Company increased the output of their compression natural gasoline plant at Depew, Oklahoma, 25 per cent by subjecting the compressed gas to a temperature of from —28 degrees to —30 degrees F.

The low temperature is obtained by the use of an expander-compressor which operates at practically no cost on merely the pressure of the dry gas leaving the pressure accumulating tank at approximately 250 pounds.

The expander is a refrigerating machine based on a principle which is one of the simplest in physics, viz., that the compression of air or other gasses generates heat, and the subsequent expansion thereof, cold.

When a gas is compressed its temperature rises. If the gas is then allowed to expand it will lose some of its heat. Furthermore, if that gas is expanded in a cylinder it will give up more heat in order to overcome the resistance which the piston offers it.

The work done by the gas during its expansion is practically the same as that done upon it during compression.

Heat and Cold

A compressor might be called a sort of "heat machine" and an expander a "cold machine", considering for a moment their relative effects, keeping in mind, of course, the true nature of cold.

An expander consists of a high and low pressure expanding cylinder. The compressed air or gas is admitted into the high pressure cylinder at generally 250 pounds pressure and is expanded to about 50 pounds pressure. This partially expanded gas is then passed into the low pressure cylinder where it is again expanded, this time to about 5 pounds.

While in ordinary refrigeration practice the expander operates on compressed air, dry natural gas works quite well. Installed at a compression natural gasoline plant it requires no special compressor but merely utilizes the dry residue gas from the high pressure accumulator tank.

It will be recalled that the heat of compression has already been extracted from the gas by the water cooler condensing coils before it reaches the expander. Therefore, when the gas under pressure is allowed to expand in the cylinders to near its original pressure, the work done during the process will be performed at the ex-

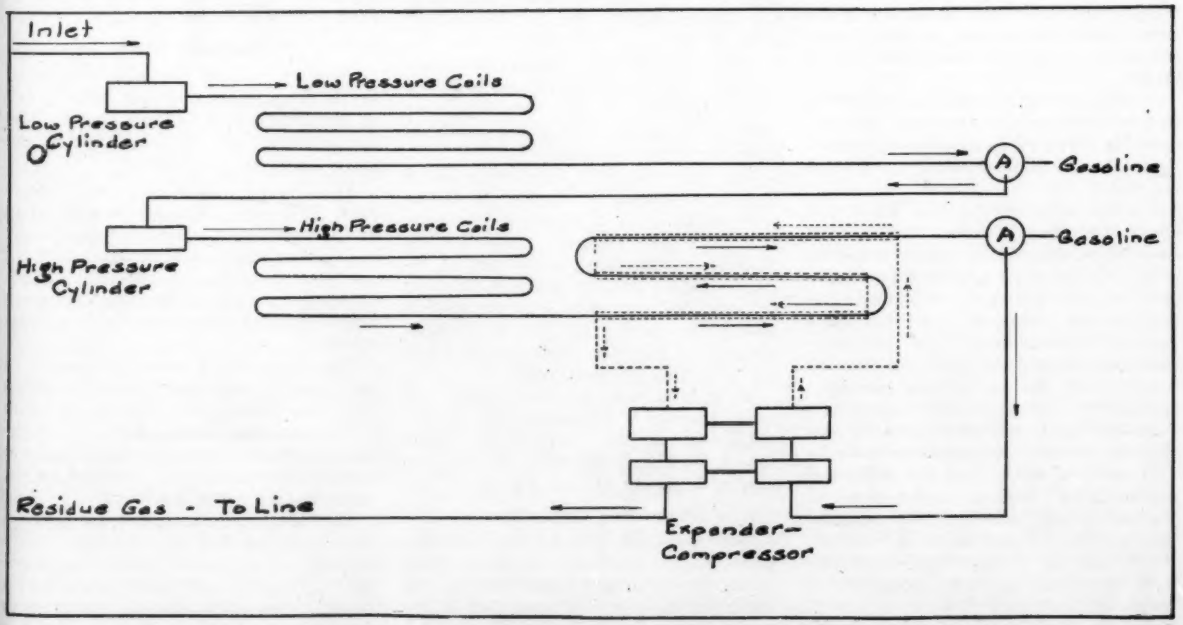


Figure 1.—Diagram of the adaption of an expander unit to a compression natural gasoline plant for further cooling treatment. Dotted lines and arrows indicate flow of cold gas

Figure 2.—Expander cooling coils installed between water cooler (left) and accumulator tanks (right)

pense of its reduced stock of heat, the result being an abnormal decrease in temperature. Then when the cold gas is brought into contact with a comparatively hot body it will restore its deficiency of heat at the expense of the hotter body, which in this case is the compressed natural gas.

How It Works

The principles involved in the process are very simple as it will be seen from the above. The gist of which is that just as compressed gas gives rise to heat, expanded gas produces that negative condition known as cold.

The expander installation by the Pure Oil Company at Depew has many points of interest. Figure No. 1 is diagrammatic of the installation.

The low pressure flow of the compression plant is of the customary arrangement, it will be recognized; the fresh gas after being compressed to approximately 50 pounds in the low pressure cylinder is cooled to near atmospheric temperature in the low pressure cooling coils, with a spray as it travels to a low pressure accumulator tank.

From the low pressure accumulator it is carried back to the high pressure cylinder where it is again compressed, thence to the high pressure water cooling coil.

Further reference to Fig. No. 1 will show that the expander cooling coils have been inserted between the water coils and the high pressure accumulator. At this point the expanded gas with its low temperature is introduced for the further cooling of the compressed casing head gas. In the expander coils the gas is subjected to a temperature of from —28 degrees to —30 degrees F. before passing on into the high pressure accumulator tank.

It will be noted that no additional accumulating tank is being used at Depew to take care of the expander product, the expansion coils being inserted directly between the water coils and the high pressure accumulator. (See Fig. 2.)

The expander coils are but double pipe coils made by running a 6-inch pipe through a section of 12-inch casing. The ends of the casing are adapted to the 6-inch pipe by means of bradenheads to obtain a gas tight arrangement.

Flow Through Expander

From the high pressure accumulator tank the residue gas is led into the high stage cylinder of the expander, then to the low stage cylinder. From the expansion engine exhaust valve the cold gas travels to the double pipe expansion cooling coil where it passes counter current to the compressed gas.

After the gas leaves the expander coils it passes on to the intake of a two stage compressor which discharges it into the return field line.

The compressor unit is connected direct to the expansion engine and is driven by it as a result of the work done during the expansion of the gas in the expander cylinders.

The entire unit is called an expander-compressor. The type used by the Pure Oil Company at Depew is a Laidlaw-Dunn-Gordon, size 8½/16 x 14/7 x 16.

With an ordinary compression-cooling type of a natural gasoline plant of good design, it is very often true that from 10 to 25 per cent of the available gasoline is not extracted.

The fact that it is frequently found in some localities that during the winter months the yield of gasoline is materially increased suggests that further cooling treatment by some sort of refrigeration or another will considerably increase the efficiency of compression plants by recovering the appreciable amounts of gasoline vapor that are lost by remaining uncondensed.

It is true that gasoline vapor can under favorable conditions be readily condensed at the temperature maintained by a well designed cooling system with plenty of cool water.

Operating Difficulties

But not all plants can operate under such conditions. In many fields water for cooling purposes is exceedingly scarce, more so than ever in the summer months.

Furthermore, a good supply of good water is more often than not hard to find anywhere and bad water spells trouble and the inefficiency of probably the most vital part of a compression plant, the condensers. The yield of a plant depends upon the efficiency of the water coolers. If heat has not been extracted from the natural gas by the time it leaves the cooling system the residue gas will leave the accumulator still containing gasoline vapors that might very well be condensed and recovered.

Artificial refrigeration is not only a means of correcting a multitude of troubles which beset plant operations but it also tends to make the compression method generally more effective.

The amount of natural gasoline that can be recovered from 1000 cubic feet of fresh gas depends upon the amount of the pentane, hexane and other heavier gases present, and the pressure produced by the compressor and the temperature maintained by the cooling coils.

At common operating temperatures in the cooling coils and pressures from the compressors, all of the gasoline yielding constituents are not extracted. The hexane, for instance, will be recovered only so long as its share by volume of the 250 pounds total pressure is above the condensing pressure at the condensing temperature of 80 degrees F.

The hexane will cease to condense and collect in the accumulator tank when the gaseous hexane has fallen in volume to that percentage of the mixture where its partial pressure is below its condensing pressure at a temperature of 80 degrees F.

Therefore, it is recognizable that the pentane, hexane, heptane, etc., cannot be completely separated from the mixture of gases by an ordinary compression-cooling process.

Stabilizer Used

Since the vapor pressure of any of the hydrocarbons decrease with a fall in temperature, it follows that at low temperatures all the condensates are more likely to be secured.

As it was brought out above, however, with very low temperatures many of the permanent gases such as butane and propane are temporarily condensed and excessive losses will be experienced when they eventually evaporate under normal temperatures and pressures.

The Pure Oil Company employs a stabilizer to cut out these wild gases very successfully. A portion of them goes into the residue line and those which contain any appreciable amount of gasoline vapors are returned to the compressors for rehandling.

The use of artificial cooling such as that supplied by an expander which utilizes very economically the compressed gas of a compression plant for refrigeration offers not a little promise for increasing the general efficiency of that sort of a plant when employed with some type of a stabilizer.

Evaluating Lubricating Oils

By Ismar Ginsberg

ONE of the most important phases of chemistry in the oil industry lies in the testing of the products that are manufactured from petroleum. It is perhaps more accurate to say that the testing of petroleum products is not only a function of chemical technology but also of physical science as well, for in the testing process not only chemical but also physical methods are employed. But it reamins that the testing of a petroleum product is one of the most important functions that the chemist performs in the oil refinery.

It is understandable that in the manufacturing process the conditions may be varied without the operator being conscious that such phenomena are taking place and that these variations will produce distillates that are quite different in properties when the conditions are maintained constant. It is also understandable that the properties of the crude oils will vary markedly and that unless proper steps are taken to make the necessary changes in the refining process products will be obtained that do not possess the correct properties. Then again it is known that unless the reagents that are employed in the refining operations are removed in their entirety the petroleum distillates are given properties which make them very disadvantageous for certain uses. It is therefore essential that the proper methods be employed in the testing of petroleum products so that it may quickly and accurately be determined just how excellent they are for the purpose for which they had been manufactured.

Purpose of Testing

In the article that follows there will be discussed some of the important characteristics of a lubricating oil and some of the methods that are employed in determining the value of the oil from this standpoint.

There are many tests which are carried out on a lubricating oil, such as, color, specific gravity, flash point, burning point, cold test, water content and percentage of impurities, as well as the proportion of free acids or free alkalies that may be contained in it. Of course the main purpose of the testing of lubricating oil is to establish its lubricating quality or capacity. In other words what it is desired to know is the effectivxeness of the oil for lubricating purposes. This is determined not only by the inherent lubricating qualities of the oil but also by its other properties which while not as highly important as the lubricating qaulity still are very influential in establishing the value of the oil for lubricating purposes as compared with another oil. Thus for example one oil may be possessed of very high lubricating qualities but contain an appreciable proportion of free acid. This oil will not be as highly esteemed as one which may have a lesser degree of lubricating efficiency but which is entirely free from free acid. Acid in lubricating oil is a decidedly objectionable ingredient.

When the matter is studied for the purpose of getting down to fundamentals, it will be seen that the desirable qualities in a lubricating oil are that it should possess the correct amount of "oiliness" or lubricating power, that it should be sufficiently stable from a physical standpoint and possess the right degree of viscosity, and finally that it should be sufficiently stable from a chemical standpoint. These are in reality the main characteristics of a good lubricating oil and the methods that are employed in the testing of the oil should bring out the quality of the lubricant from these standpoints.

Determining Lubrication

It is one thing to say that the lubricating oil should possess certain properties and quite another to define these properties. It is not always an easy matter to do so and to express the definition in physical or chemical terms which admit of mensuration. Thus "oiliness" is such a term. It is understandable that what is meant by oiliness is clearly the ability of the oil to lubricate but it is an entirely different matter to express this term in physical coefficients of such a nature that they can be measured.

Oiliness is sometimes considered to be connected in some way with the static friction of the oil film between two metallic surfaces. It is possible to measure this static friction with a great degree of accuracy, but in order to do so requires so much carfeul and painstaking work and the expenditure of so great an amount of time that it is hardly feasible to carry this method out in a practical way in the oil refinery laboratory. It is however a fact that it is possible to obtain a very good idea of the value of a lubricating oil by making this test if it were possible to devise some apparatus for carrying it out which would not be surrounded with the difficulties that pertain to the use of stable friction instruments that are available at the present time.

The physical character of the oil must be such that the influence that it meets in ordinary use either in the bearing or in the internal combustion engine or steam engine cylinder are not able quickly to destroy its lubricating qualities. Thus the viscosity of the oil is an essential quality and while the oil will become less viscous when it is subjected to heat, it must not lose its viscosity too quickly. Otherwise it would not be of much value for use in places where it comes into contact with high temperatures. Then again its volatility must be low and the degree of volatility must not increase too much as the temperature rises. Furthermore the oil must also possess a low solidification point. This is particularly important where the oil is employed in cold climates or on refrigerating machinery or under any other conditions where it comes into contact with low temperatures. If the decrease in the temperature of the oil results in its rapid solidification, then the oil can scarcely be employed for any purpose where the temperature conditions are unfavorable. These three properties determine the physical stability of the oil, that is, its ability to remain in a physical state that is advantageous for lubrication under temperature change.

Chemical Changes

It is a fact that the physical stability of a lubricating oil has been emphasized much more strongly than its chemical stability, and the reason for this may be that the chemical stability of a lubricating oil has not been well understood. But on closer examination of this property of a lubricant it will be seen that the resistance of the oil to changes that are of a chemical nature is a very important matter, fully as significant as the physical stability of the oil, if not more so.

The chemical changes that a lubricating oil may undergo are dependent on the manner in which it resists agencies which tend to oxidize it or to decompose while it is in use. If the oil is to give good results it must be able to withstand the chemical influences and physical agencies which tend to destroy it by oxidation and decomposition.

It therefore follows that tests which determine the chemical stability of a lubricating oil are of considerable importance. There are two such tests which are familiar to oil men, the Conradson coking test and the oxidation or sludging test. The coking test is found to give reliable results when it is carried out under the proper conditions. It also essential to use the same make of apparatus in making these tests if comparative results are to be obtained. In general the same precautions apply to this test, as far as comparative results are concerned, as to

the viscosity test, in which, as is known, the construction and dimensions of the viscosimeter are of prime importance.

In an article which is contained in the Journal of the Institute of Petroleum Technologists, there is discussed the value of the test as it is not constituted for this purpose. It is mentioned that there is too much opportunity for variation in the thickness of the metal of the outer crucible in the apparatus employed in the cooking test to admit of comparable results being obtained. This appears to be a valid objection to the test for the rate of heat transmission will be materially affected by the thickness of the metal. An important matter is also the thickness and the materials of the inner crucible. It is understandable that here again the rate of heat transmission will be affected and that different results will be obtained with a porcelain inner crucible than with a silica one. The authors of the aforementioned article also say that the dimensions of the size of the hood are also of importance in determining the value of the results obtained, but it does not appear that this is so valid and important an objection as the dimensions of the apparatus itself. It follows that if all the parts of the apparatus employed in the process are carefully dimensioned and when these dimensions are maintained constant results can be obtained in the cooking test which will be entirely comparable.

Value of Test

But there remains the value of the test itself, and the interpretation that is made of the results that are obtained with it. The value of the coking test is not so well understood and it is really a difficult matter to give a correct interpretation of the results that are obtained with it. There is however a great difference between various lubricating oils in this respect, that is, some of them coke much more readily than others. It is generally held that the oil which has the lowest coking test is one which is the best from a lubricating standpoint, provided all other properties of the oil and conditions are alike.

There are so many factors which determine the value of a lubricating oil that it is impossible to compare two or more oils simply on the results that are obtained in one test. All the various tests that are made on the oil must be considered together and it is only from a careful study of all the factors involved that a final correct evaluation of the oil can be obtained. This does not mean that the test does not possess a certain importance or that any test should be dropped in prefernce to another, but simply that the oil should not be judged because of bad or good results that are obtained in the determination of a single one of its properties. Of course some tests are more suitable for application to certain grades of lubricating oils than to others, and this applies to such a test as the coking test. Thus it is only the rather heavy lubricating oils, such as cylinder oils, that require to be tested in this manner, for it is a difficult matter to differentiate between the coking values of the light lubricating oils as they lie too close together.

In the aforementioned article to which the author is indebted for certain of the information that is contained in this study a sharp criticism is made of the oxidation test, which has been mentioned as another of the important tests to which a lubricating oil must be subjected in order to determine its chemical stability. In making this test the oil is subjected to heating for a prolonged period of time and then the effect of the heating in oxidizing the oil is determined. If for example any two oils are taken for comparison on this basis, it is essential that both a temperature of heating and a duration of heating be selected that will best tell which oil will oxidize more. It is understandable that there may be two oils which when heated for ten hours at a certain temperature will show a marked difference in degree of oxidation, but then again this duration and temperature of heating may not show any marked difference at all in the case of other oils. It is therefore necessary to select the proper temperature and time of heating whenever an oil is tested. This is of course a decided disadvantage of the method for it is patently impossible in most cases to tell just how long and how hot the heating must be without first making a preliminary test.

How Determined

The determination of the degree of oxidation by this test is effected by measuring the amount of sludge that is formed. It is for this reason that the test is sometimes called the sludging test. This is of course an important characteristic of the oil, for the quicker it oxidizes and the more sludge it forms the less is its value from a lubricating standpoint.

But oxidation of the oil by subjection to long heating at comparatively high temperatures, conditions which are found in the practical use of the lubricant, not only produce a certain amount of sludge but a certain amount of acid as well. This is a very significant result of oxidation of lubricating oil, for the acid that is formed in this manner will be very decidedly detrimental to the metal bearings or cylinder walls and piston heads that it comes in contact with. Hence the test is of special importance when applied to those lubricating oils that are used in the internal combustion engine cylinder.

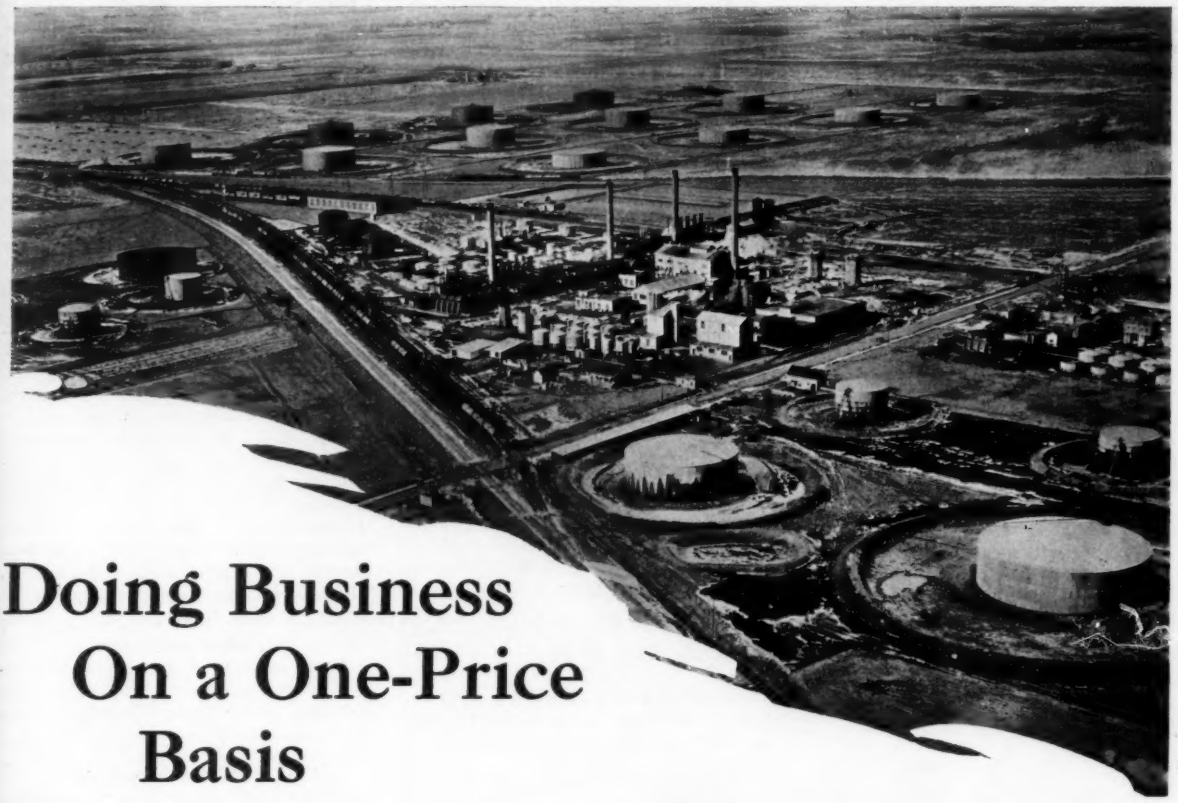
It has also been pointed out that the mere determination of the amount of sludge formed, while of value, is by no means the most important feature of the method. For the character of the sludge is also of considerable significance and it may well be that one oil may give more sludge but whose properties are less detrimental than another oil which may give less sludge of more harmful effect.

Disadvantages

Other disadvantages of this test are the fact that it is very difficult for two different operators to secure comparative results and that it takes so long for completion. Ordinarily the test lasts for forty-five hours which is evidently much too long for the regular plant laboratory. In any test the practical value is determined by its length and as a general rule in the plant laboratory a test which takes more than twenty-four hours for its completion is unsuitable. Thus it should be possible to start the test in the morning and have it ready for completion the following morning. A longer test can scarcely be used for practical refining operations.

A modification has been made in the oxidation test which has resulted in a considerable reduction of the time required for performing it. This modification consists in doing away with the copper foil and the temperature at which the test is carried out has been raised to 170 degrees C from the usual 150 degrees C. It has been found that the time spent in making the test has been reduced in this way from 45 to six hours. Of course the results are not the same as those obtained by the standard test, but it has been found that the ratio between the two tests is a constant one, except in a number of isolated cases, and thus it is possible to convert the results of the modified test into the corresponding results obtained by the standard test by the use of a multiplying factor. In this manner the data obtained with the quicker test can be compared in a satisfactory manner with that obtained in the longer test.

There has been much discussion on the disagreement of results obtained by different operators in using the oxidation test on lubricating oils. In general any such disagreement is due to the fact that certain conditions, which are of paramount importance in the test, are not given the proper attention that they require. Thus in the oxidation test variation in temperature is an important factor in yielding results which cannot be compared with others obtained from the same test. It is essential that all efforts be made to keep the temperature constant. Another source of error is the quantity of air passed through the apparatus. While both this condition and the one aforementioned may be given careful attention, nevertheless they are factors which admit of great difficulty in accurate control. Another important factor is the presence of impurities. Thus it has been found that the presence of dust will increase the oxidation value of the lubricating oil as much as 0.5 units.



Doing Business On a One-Price Basis

Strict adherence to business fundamentals keeps Champlin Refining Company at forefront

By Grady Triplett

WHEN a concern gains a commanding position in its business field, the natural thing is for men to wonder about the extraordinary methods by which the growth has been accomplished. Exceptional progress implies policies so strange they may well be classed as mysterious. A man is a wizard when he surpasses the average of his line of endeavor.

The history of these searches for the mystery of business progress has been failure. Instead of methods strange to ordinary practice, the common thing is to find only the elementary principles of trade pulling a concern along at top speed. Such has been the result of the efforts to learn by what charm concerns are so managed that they climb quickly where others climb slowly, or fail to climb at all.

And getting down to a particular instance, one within the refining division of the petroleum industry, the Champlin Refining Company of Enid, Oklahoma, offers an example in proof of a general rule outlined above. Its growth is often referred to as phenomenal. It is supposed to have the guidance of men who know methods and policies strange to those in vogue with other refining concerns.

But investigation fails to reveal them. Instead the concern follows methods that are known to men in each phase of commerce. Instead of extraordinary practices, it clings to some time-worn rules, whose presentation can hardly be accomplished in a manner to arouse consideration.

It is difficult to present the commonplace in spectacular style. A golden slipper draws golden words. But a rubber boot can be only a rubber boot and it will not stand for three-syllable words.

Really the story of the Champlin Refining Company is a modern example of a bright saying to the effect that a good mouse trap, or rather a better mouse trap built in the heart of the woods will result in buyers beating a trail through the trees that their house cats may not be forced to work overtime.

Healthy Growth

Of course there has been effort behind the Champlin Refining Company. But the effort is exceptional only in the intensity with which basic rules of trade are applied. What they do in the office and plant any refiner can do. They simply turn out a good product and sell it at a fair and consistent price.

The company needs no words in proof of the statement that it has had exceptional growth. It might find denial in the Champlin office, for they are not prone to look on their accomplishments through rose-tinted eye glasses.

But seven years ago, the Champlin plant at Enid had a daily throughput of one thousand barrels. Now it can run sixteen thousand barrels daily without taxing the capacity. So much for its growth.

Here comes something exceptional. But it is exceptional in accomplishment rather than exceptional in the methods by which it has been accomplished. In the past four years, it has become a sort of fixed opinion that successful refinery operation involves the owning of oil production.

Not so with the Champlin company. It has some production but only a scant part of the crude it requires for steady operation. As a producing concern, it has never enjoyed phenomenal success. So it is dependent on the fluctuations of the crude oil market for its raw material.

Few Contracts

More recently it has become a verity of refining that cracking units are essential to economical gasoline manu-

facture. A lot has been written and more spoken about the necessity for refiners adding pressure stills to their plants.

But the Champlin plant turns out only straight run gasoline. There is no disposition to look with disfavor on cracking methods. So far, however, the plant has operated by straight distillation.

Another of the popular requisites for successful refinery operation is the seasonal contract on gasoline. To be successful, the refiner must have his output sold, at least a substantial part of it, for months ahead of manufacture.

But the Champlin company sells on a spot market. It never gambles on prices. Its prices are fixed each day. When a price is fixed, it is fixed. Gasoline at 10 cents means just that and nothing else at the Champlin office. That may be something bordering on the exceptional in refinery sales but certainly there is nothing sensational in deciding upon a policy and sticking to it.

There may be some other items in which this company goes along doing a steady business without benefit of new-fangled methods and equipment, but these are sufficient to establish contention that this concern has no magic wand guiding its destinies.

Just One Rule

The Champlin code of business practice can be summed up as—doing business on a one-price basis. That is one rule it has, and it follows it with just sufficient exceptions to make it a good rule. The exceptions, as will later be pointed out, are in favor of the buyer of gasoline, kerosene, fuel oil or some other product of the plant.

All business dealings are measured by one yard-stick. Its measuring begins when crude oil is bought at the wells. It ceases when the finished products are sold to jobbers.

Having but limited production of its own, the company is forced to own pipe lines. These tap the Garber, Tonkawa, Watchorn and two Billings pools, certainly the cream of light oil in Oklahoma. Now the price of crude oil in one of these fields, so far as the Champlin company is concerned, is the price of crude oil in each of the other fields. And the price with one producer is the price for each other producer.

Take a case where the company may have contracts at fixed figures and more crude is wanted. It may be impossible to get other connections at figures equal to the contracts existing. If a higher price must be paid to get the additional oil, the price goes up for the producers already furnishing oil.

If there is anything exceptional in that, it must be on the score of not being commonly done rather than on the score of being difficult to follow. It is useless to add that the Champlin company seldom loses a connection.

It does bring forth the opposition of what is to be done when crude is too plentiful rather than too shy. The refiner may arise to ask—what is done when crude is to be turned back? That's a pertinent question, for it has come often enough to refiners of the Mid-Continent area in the past four years.

Keep on Selling

So far as the Champlin company is concerned, it is answered by keeping sales moving forward instead of backward. The company does not sell more gasoline in winter than in summer. It has some storage to take care of seasonal fluctuations. But steady sales keep the tanks waiting for more gasoline from the stills.

National Products Company Builds Baffled Towers

The National Products Company, having natural gasoline plants in the Cleveland area of Oklahoma, has adopted a baffled type of water cooling tower.

The towers are built 30 feet high in derrick style, being latticed on all sides.

Six table baffles are placed inside the tower, each leaving space at the edges for water to drop over, catching on the next table.

The tower sits in a concrete sump, from which water is drawn for the cooling system of a gasoline plant.

Water is pumped to the top of the tower and left to find its way to the sump below by gravity.

The tower shown herewith is at the plant two miles south of Cleveland. It is set on an incline beside the plant.

Baffled water cooling tower

Any refiner may be pardoned for tilting his ear a bit in the hope of learning some secret that will result in steady sales. But there is nothing of a secret to come from the way this is done at the Champlin office.

The price of gasoline is fixed in the Champlin office and that is the price until conditions warrant a change. It makes no difference whether a man buys one car or a hundred, the price is the same. In fact most of the customers of the Champlin company are "one-car buyers." This must not be accepted as meaning the customers take a car a week or less. But a concern requiring thirty cars of gasoline a month is classed as a "big buyer" in the Champlin office.

Now here is something to make brain cells perform a few gymnastic feats. The buyers of Champlin gasoline consistently pay a price higher than the ordinary market. Furthermore half of the orders that reach the office do not mention price. Most orders are only instructions to ship on a certain date. Price is left to whatever figure may prevail at that time.

Favor the Buyer

A buyer, however, does get the benefit of down fluctuations, while the company never takes advantage of upward movements, between ordering and shipping dates.

For instance, a buyer may inquire on Saturday, asking the price of gasoline. When told the price he may ask that a car be shipped Monday.

By Monday the Champlin company may have decided to advance the gasoline price a quarter of a cent. But that buyer will get his car at the price mentioned Saturday. If, however, the price has declined a quarter of a cent by Monday, the buyer gets the benefit of that.

The company prefers to deal with jobbers. A substantial concern with fair distribution is the favorite customer of the company. Where it has a jobber customer of this sort, it sells exclusively to him in that city or territory.

The company never offers gasoline for resale through brokers. That is a question of policy, as one object of the concern is to protect its customers.

All this need not lead to the conclusion that selling is a matter of receiving orders in the Champlin office. A force of 13 men stays on the road constantly. The middle states draws the bulk of the plant's gasoline output. These men sell at prices fixed in the Enid office.

Gasoline is shipped as far as Pennsylvania. Some of the gasoline shipped out of the Champlin plant travels to a distance requiring a freight rate of $1.26 a hundred.

Now it may be exceptional to do all this in the refining branch of the petroleum industry, but if there is anything exceptional in the way it is done in the Champlin organization the men responsible are not aware of it.

Recovery of Sodium Plumbite In Refining

IT is indeed strange that with the millions of pounds of litharge (lead oxide) consumed each year by the petroleum industry in the "sweetening" of gasoline that a successful process for its recovery in some usable form has never before been devised. Litharge is the most expensive chemical used in the treatment of gasoline and kerosene and its cost runs into enormous figures.

Such a process has been developed and is covered by U. S. Patent 1,525,301 issued to A. Kinsel. It is now controlled by the Litharge Recovery Corporation, 111 Devonshire St., Boston, Mass. The process comes at a particularly opportune time with the price of lead oxide rising and many of the refining companies turning to cracking processes to increase their gasoline yield — the increased production of cracked gasoline adding greatly to the consumption of litharge.

The process is simplicity itself,—requiring no skilled labor to operate it, and utilizing only used chemicals from the gasoline treatment, the disposal of which has heretofore constituted a serious question to most refiners.

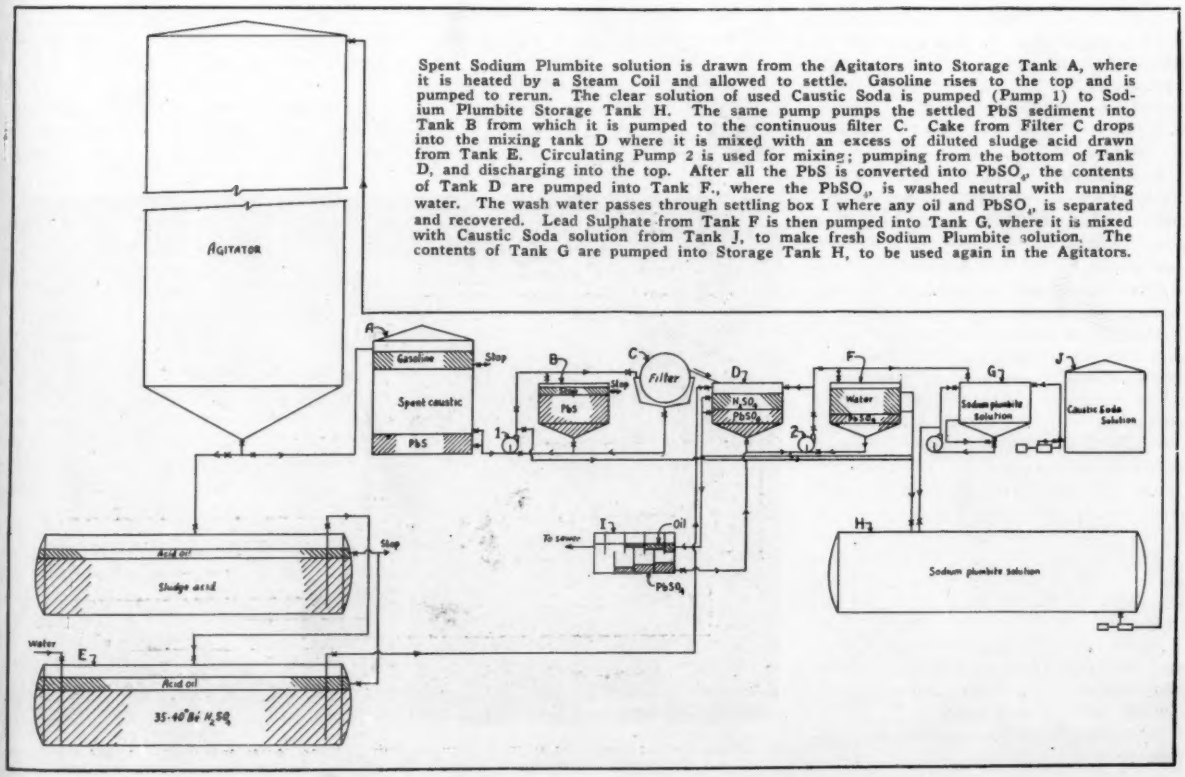
Any "treater" knows the reactions involved when "sour" gasoline is subjected to the "Doctor" treatment but let us say the following for those not so well informed: Doctor solution is prepared by dissolving lead oxide in caustic soda solution and is known chemically as Sodium Plumbite. During treatment the lead component of the Sodium Plumbite combines with the undesirable sulphur component in the gasoline and is precipitated as lead sulphide, thus rendering the gasoline "sweet". This lead sulphide is drawn off and, in the past, disposal has been made of this waste product in the easiest and best manner possible. But with the advent of the Litharge Recovery Process, this hitherto valueless lead sulphide takes on a new and substantial value.

The process briefly is as follows:

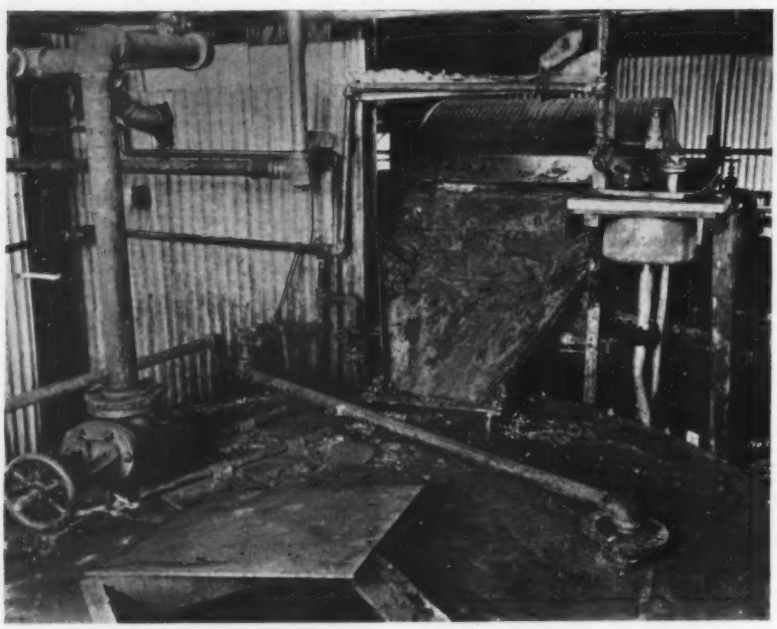
The lead sulphide as drawn from the agitators is run to a filter where it is separated as far as possible from the caustic soda solution present. The filtered lead sulphide is discharged to a tank where it is mixed with diluted "sludge" sulphuric acid from previous gasoline treatment and is converted in this reaction to lead sulphate. The converted sulphate is washed free of acid and dissolved in caustic soda solution which gives the desired "Doctor."

The reactions involved are:

"Doctor"		Hydrogen Sulphite		Lead Sulphide		Caustic Soda		
$Pb(OH)ONa$	+	H_2S	=	PbS	+	$NaOH$	+	H_2O
LeadSulphide		Sulphuric Acid		Lead Sulphate				
PbS	+	H_2SO_4	=	$PbSO_4$	+	H_2S		
Lead Sulphate		Caustic Soda		Doctor		Sodium Sulphate		
$PbSO_4$	+	$3NaOH$	=	$Pb(OH)ONa$	+	Na_2SO_4	+	H_2O



Spent Sodium Plumbite solution is drawn from the Agitators into Storage Tank A, where it is heated by a Steam Coil and allowed to settle. Gasoline rises to the top and is pumped to rerun. The clear solution of used Caustic Soda is pumped (Pump 1) to Sodium Plumbite Storage Tank H. The same pump pumps the settled PbS sediment into Tank B from which it is pumped to the continuous filter C. Cake from Filter C drops into the mixing tank D where it is mixed with an excess of diluted sludge acid drawn from Tank E. Circulating Pump 2 is used for mixing; pumping from the bottom of Tank D, and discharging into the top. After all the PbS is converted into $PbSO_4$, the contents of Tank D are pumped into Tank F., where the $PbSO_4$, is washed neutral with running water. The wash water passes through settling box I where any oil and $PbSO_4$, is separated and recovered. Lead Sulphate from Tank F is then pumped into Tank G, where it is mixed with Caustic Soda solution from Tank J, to make fresh Sodium Plumbite solution. The contents of Tank G are pumped into Storage Tank H, to be used again in the Agitators.



Installation at Beacon Oil Company, Everett, Mass. Filter and Conversion Tank

A more detailed explanation of the process is as follows:

The lead sulphide and spent caustic soda solution drawn from the agitators is run to a settling tank where by means of a steam coil it is warmed up and then allowed to settle,—this warming greatly facilitates the separation of the lead sulphide and caustic. The clear settled caustic solution is drawn off to be made further use of and the lead sulphide is pumped to the filter. Here it is filtered as dry as possible (about 30% moisture content) and then discharged into a tank containing a necessary amount of diluted sludge acid for the conversion of the sulphide to the sulphate.

The acid used is the sludge acid from previous gasoline treatment which has been diluted with water to 35-40 degrees Baume and allowed to stand for separation of the tar present.

After complete conversion in this tank, the lead sulphate is pumped to a washing tank where it is washed to an acid content of about 0.5%. The lead sulphate is now ready to be discharged to storage or direct to the solution tanks where it is mixed with caustic soda solution to give fresh "Doctor" solution.

The process not only totally recovers the lead sulphide, it also recovers 75 to 80 per cent of the caustic soda used in making up the "Doctor" solution, and the gasoline which may be drawn from the agitator along with the lead sulphide.

As the lead sulphide is totally recovered and converted into Sodium Plumbite, it naturally assumes the prevailing market value of lead oxide.

The principal advantages of the process are:

1 Total recovery of the lead sulphide.

2. Recovery of 75 to 80 per cent of the caustic soda.

3. Partial use of sludge acid.

4. Recovery of all gasoline drawn off with the lead sulphide.

5. Reduction in labor cost of handling drums of caustic and litharge.

6. Less use of lead sulphate than lead oxide due to higher solubility.

7. Elimination of the lead poisoning hazard.

The value of the process has been well proven in an installation at the Beacon Oil Company at Everett, Mass., where it has been operating with complete satisfaction for seven months. It has entirely eliminated the use of fresh litharge and has reduced the treating costs to a fraction of what they formerly were.

Most refineries use at least 500 pounds of litharge per day. A litharge recovery plant to recover this amount would cost about $6000, depending on the location and local conditions at the refinery. Total operating and fixed charges for this size plant would be about $5.00 per day. The process would show the following savings:

1. Sodium Plumbite recovcovered calculated as PbO 500 lbs @ 12½c.....	$ 62.50
2. Caustic Soda (corresponding to 500 lbs. PbO 80% of total caustic is recovered) 2400 lbs. @ 3½c.....	84.00
Total saving on chemicals....	$146.50
Operating costs	5.00
Net savings per day	$141.50

The above calculation does not take into account the saving due to the recovery of gasoline from the spent doctor solution. This saving can easily amount to $20.00 per day on a plant of this size.

The Litharge Recovery Corporation is arranging to license the process to oil refiners on very reasonable terms and it is expected that the process will be extensively adopted by the oil industry.

Brown Opens Branch Offices

Philadelphia, Pa.—The Brown Instrument Company announces the opening of branch offices at Indianapolis, Indiana, 215 East New York Street, and at Cleveland, Ohio, room 1108 Hippodrome Building.

J. R. Green is in charge of the Indianapolis office, and G. S. Frazee manages the Cleveland office.

Installation at Beacon Oil Company, Everett, Mass. Filter under rear light. Conversion tank in rear between the container (D) on the left and the container (E) on the right

Natural Gasoline Plants and Camps in the Salt Creek Field

Natural Gasoline Plants Gain Hold In Salt Creek Field

Low yield offset by efficient equipment and handling by pipe lines to Casper

By Brad Mills
Staff Representative

RISING steadily from a position of little or no importance, the casinghead gas industry in the Salt Creek field has grown in a few years to be the source of much additional revenue to the operators of gas plants in the field. In the beginning, the operators in the field were like those in almost every other field in the country. They frowned on the possibilities of recovering gasoline from casinghead gas. They were chiefly interested in the recovery of oil.

The pipe line situation during the early history of the field was a chief contributing factor to the lack of interest in casinghead problems. Eight years ago the pipe lines from Salt Creek to Casper were few and greatly overworked. All lines were pressed into service as oil lines. This left little recourse for the advocates of gas plants. Gasoline could not be hauled 50 miles and sold at a profit. The results of the whole thing was the wasting of hundreds of millions of cubic feet of rich casinghead gas, which might have been converted into high grade natural gasoline.

There are now in the Salt Creek field, three major gas plants. Their combined capacity is about 60,000,000 cubic feet of casinghead gas daily. Salt Creek gas yields on an average, about one and one-half gallons of gasoline per thousand cubic feet. All of these plants are now running practically at capacity.

The Midwest Refining Company, controlled by the Standard Oil Company of Indiana, operates the largest single compression gas plant in the world. This is brought about, of course, by classing its four plants as one unit. They are located only a few yards apart and really perform one duty. Two of these plants are slightly obsolete but they are kept running night and day to take care of the gas from 1000 wells operated by the Midwest interests. The combined capacity of these four units is more than 40,000,000 cubic feet of gas daily. It is entirely a compression plant and recovers upward of 60,000 gallons of gasoline daily.

Plant Equipment

Midwest plant No. 4, the largest single unit operated by the company, consists of four 970 horsepower, four-cylinder horizontal type Cooper compressors. On the compression end, the low pressure cylinders are 32 inches by 36 inches and are designed to operate at 40 pounds pressure. The high pressure cylinders, which are built in to the low-pressure on one block, are 15 inches by 36 inches and operate at 200 pounds pressure. The low-pressure cylinders pick up the gas from the booster stations, scattered throughout the field, at one or two pounds pressure ordinarily and force it through the low-pressure condensers. From these condensers, the gas is returned to the high-pressure cylinders. These, in turn, raise the pressure of the gas to more than 200 pounds and send it through the high-pressure condensers. The dry gas is then sent to large pump stations, which push it 45 miles to Casper, where it is used by the company's 60,000 barrel refinery. Several million feet of the gas, however, is used daily by the company's electric plant near the field. Plant No. 4 will handle 16,000,000 cubic feet of wet gas daily.

Midwest Plant No. 3 is designed the same as No. 4 and has the same type equipment. It has, however, only three Cooper compressors. Its normal capacity is 12,000,000 cubic feet of gas daily. Both of these plants were built about four years ago.

Midwest Plant No. 1, the original Salt Creek compression plant, consists of nine 165 horsepower, twin type belt-driven Bessemer gas engines and nine combination low and high pressure compressors. The engines are rather old but operators said they were very simple and caused little trouble. On the low side, the compressor cylinders are 16 inches by 20 inches and are designed to pick up the gas at any pressure near atmosphere. The high pressure cylinders are eight inches by 20 inches. The belts used are leather and cost more than $700 each. Plant No. 1 will handle approximately 7,000,000 cubic feet of gas daily.

Midwest Plant No. 2, located alongside No. 1, has the same power equipment and the same number of Bessemer engines as No. 1, but the compressors are of a different construction. This plant uses nine Ingersoll-Rand combination high and low pressure compression units. These units are slightly smaller than those in No. 1 plant, being only 16 inches by 16 inches on the low side and eight inches by 16 inches on the high side. This gives the plant a maximum capacity of nearly 5,000,000 cubic feet of gas daily. All equipment in this plant is belt driven. The Midwest Refining Company originally invested heavily in this type of equipment and probably will continue to use it as long as it functions satisfactorily. All recent equipment purchased has been of the very latest type.

The Midwest Refining Company has been very liberal and sensible in build-

ing the 20 up-to-date booster stations all over the Salt Creek field. These stations are located so as to give the gas plants a steady supply of gas at all times. The size of the field and the declining gas pressure at the wells has made this policy imperative. These stations are all designed to operate at a very low pressure—just enough to feed the gas to the compressors. All of these stations do not contain exactly the same equipment, but it is practically the same and all serves the same purpose. A typical booster station contains five 80 horsepower Bessemer engines with five 23-inch by 20-inch Laidlaw low pressure compressors.

Gathering System

A great deal of time has been spent in working out the details for the most effective field gathering system. All sizes of pipe from two-inch to 10-inch are employed. In coming from the wells, two or three inch pipe is used. The Midwest interests are gradually doing away with the old-fashioned gas traps throughout the field. The small pipe lines leading to the booster stations pick up the gas either from gas-tight flow tanks or directly from the wells. Four or six-inch pipe is used in conveying the gas from the boosters. As several stations gradually get on one line, the size of the pipe is increased. In some cases, the pipe lines leading into the main gas plants are of 10-inch construction. This gives ample volume. In smaller pipes, the compression plants could draw all of the gas out of the booster lines in a few strokes, provided the field stations should become temporarily disabled.

The field gas department of the Midwest Refining Company employs 350 men. A separate camp is kept for this department. Club rooms, tennis courts and good living quarters are provided for the men at a nominal cost. The isolation of the field necessitates boarding the men.

Line for Gasoline

A three-inch welded pipe line is used to carry the gasoline from the Salt Creek field to Casper. This line was laid about three years ago. It is one of the longest gasoline lines in the entire country.

The Carter Oil Company's, although rated strictly as an absorption plant, contains an unusually large number of engines to bring the casinghead gas up to the desired pressure before it is sent to the oil. In the main plant, ten 165 horsepower, type 6 Bessemer gas engines are used as the main pressure units. Eight Type 8, 80 horsepower Bessemer engines are used as vacuum pumps. In addition to these, one 165 horsepower, twin type Bessemer engine is used for auxiliary purposes. The greater part of the absorption equipment was designed or arranged by the company's own engineers. Braun heat exchangers are chiefly used. A Braun pre-heater of large capacity was recently installed. The capacity of the plant is 12,000,000 cubic feet of gas daily but is now taking about 10,000,000 cubic feet. The recovery of gasoline at this plant runs about 1.6 gallons per thousand cubic feet of gas. This gives it a maximum capacity of 19,000 gallons of gasoline daily. A greater part of the gasoline now recovered is being marketed in Canada.

The Carter interests also maintain a large and varied system of field gathering lines. It takes the gas chiefly produced in the southeastern part of the field. A typical Carter booster station consists of five 165 horsepower T-10 gas engines with low pressure compression cylinders. These stations pick up the gas and constantly feed it to the main absorption plant.

Many of the smaller operators in the southeastern part of the field sell their gas to the Carter plant. The Carter holdings in the Salt Creek field are not unusually large, which necessitates getting the gas anywhere it may be obtained.

Ohio Uses Absorption

The main plant buildings, as well as the camp built around them, are as modern as they can be made under the circumstances. The main building is 240 feet by 30 feet. The houses occupied by the plant employees are clean and up-to-date. The company employs 50 men to carry on the work at the plant and booster stations.

The Ohio Oil Company operates a 10,000,000 cubic foot absorption plant near the southern end of the field. This plant chiefly takes care of the gas in the southern and southwestern part of the field. In addition to the gas taken from its own leases, the Ohio interests buy large quantities of wet gas from small operators.

The Ohio oil plant does not have an unusually large amount of equipment outside of the stills, etc., but the arrangement is cleverly worked out. Eleven 165 horsepower Bessemer engines with built-in vacuum pumps are used in lieu of booster stations scattered in different parts of the field. Two twin type 165 horsepower Bessemer engines are used to operate the auxiliary power. The very latest Westinghouse electrical equipment is exclusively used in the plant. One 165 horsepower Bessemer gas engine is also used to recompress the gas after it comes from the absorption plant.

The recovery of gasoline per thousand cubic feet of gas in the Ohio plant is about 1.6 gallons, or practically the same as the absorption plant operated by the Carter Oil Company or the Midwest Refining Company's giant compression plant. The plant is now taking about 6,000,000 cubic feet of gas daily. The average daily gasoline yield is about 10,000 gallons.

Whether more gas plants will be built in the Salt Creek field is a difficult question to answer. It is reasonably safe to say, however, that no more will be built. The casinghead industry had a hard time in getting a firm foothold, but once it did, it ran the production end of the game in the field a close second, as far, at least, as efficiency was concerned.

BUILDING A REFINERY OR NATURAL GASOLINE PLANT?

If you are contemplating building a refinery or natural gasoline plant you should be a subscriber to

The REFINER and NATURAL GASOLINE MANUFACTURER

This journal specializes in that branch of the oil business that its name indicates. The subscription price is $1.00 per year.

Address

THE REFINER

and NATURAL GASOLINE MANUFACTURER

Box 1307 **Houston, Texas**

Brown Pyrometer Catalog

The Brown new design pyrometer is completely described and illustrated in a booklet published by the Brown Instrument Company, Philadelphia, Pa. Copies of the booklet will be mailed upon request to the company.

Yes Sir

15 years experience in building the Oil Industry's finest tools has eminently fitted The HUGHES TOOL Co. to build the Oil Industry's finest steel Valves

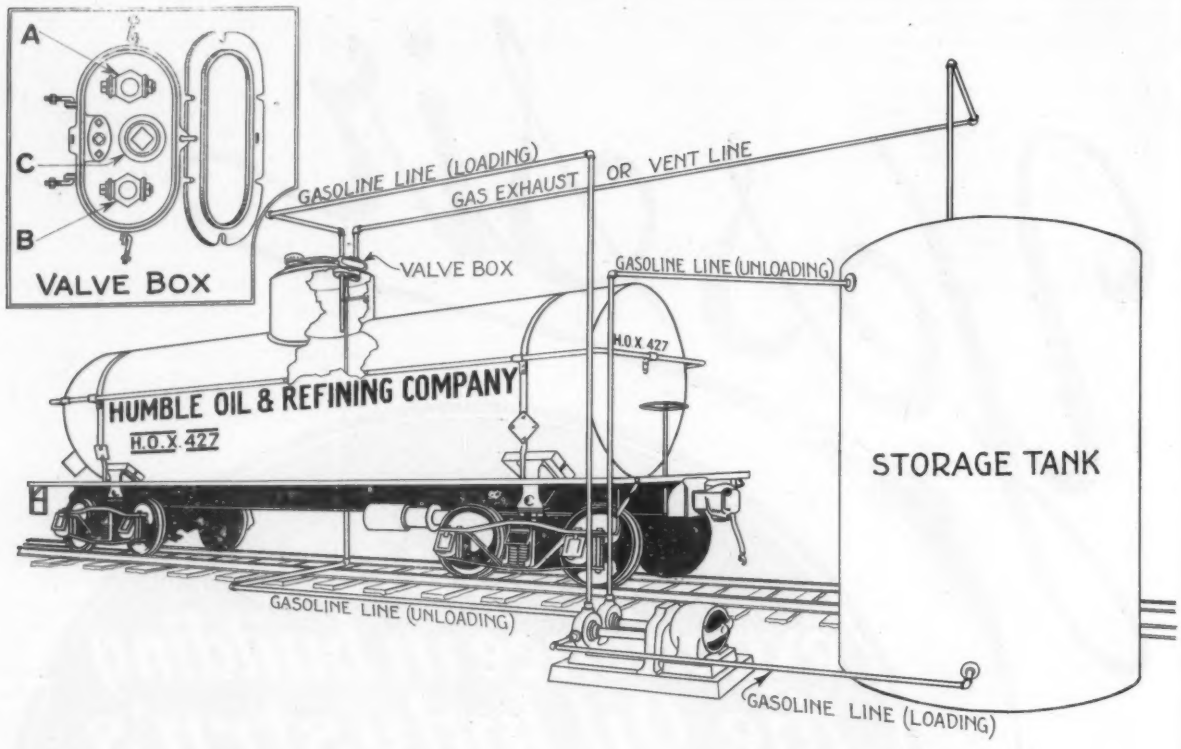
HUGHES TOOL COMPANY

Branch Plants
Los Angeles, Calif.
Oklahoma City, Okla.

Main Office and Plant
HOUSTON, TEXAS

Export Office
New York City

Tell them where you saw the ad.



Saving Vapor Accomplished With Closed System of Loading

Humble Oil & Refining Company is equipping tank cars with new valve device to eliminate escape vapors

By R. G. Hamaker
Chief Engineer, Humble Oil & Refining Company

THE recent development by the Humble Oil & Refining Company of Houston, which permits the loading and unloading of natural gasoline from tank cars through a closed system between the tanks and tank cars will mean the saving of many thousands of gallons of vapor gasoline which have heretofore been lost during the loading and unloading by the ordinary open system.

The principle of this closed system is to have two lines of pipe between the gasoline storage tank and the tank car, one of which is used for transferring the liquid gasoline from the storage tank to the tank car or vice versa while the other line is used as a return line for gas or gasoline vapors given off.

The principal difficulty in using such a system is the making of such connections as will be practical to install and operate and yet leave the tank car in a safe condition when in transit. This difficulty has been overcome by the Humble Company by the placing of a steel valve box in the dome of the car. This valve box has in its bottom four openings. In one of the openings is located a stuffing box through which an extension of the stem of the bottom outlet valve passes so that same can be operated from within the valve box without opening the tank car. Another of the openings is threaded to receive on the bottom side a length of pipe extending down to the top of the fluid in a loaded car and to receive on the top a valve or stop cock to which connection is made with the gasoline line from the storage tank. Another of the openings is threaded to receive on the top side a valve or stop cock to which is connected a gasoline vapor return line between the storage tank and the tank car. The fourth opening is threaded to receive a valve or stop cock through which a gauge pole or sampler can be run for measuring the contents of the tank car.

This valve box has a steel cover which is bolted onto the box and which fits with a finished surface against a lead gasket in the top rim of the box to make a sealed joint. When the tank car is in transit, carrying a load of natural gasoline and with the valve box lid bolted down against its seal it is in the same sealed condition that it was prior to the installation of the valve box with the only escape for vapors being through the regulation safety valves on the tank car dome; for should any of the fittings in the valve box leak, the leakage would be contained within the box.

Loading Process

After the tank car has been spotted for loading the top of the valve box is removed while all valves on the inside are closed and the gasoline line which is to convey the gasoine into the car is connected to valve cock marked "B" on the accompanying drawing, which has below it a length of pipe extending only as far into the tank car as is desired to have the level of the liquid in the loaded car. A gas line from the top of the storage tank is then connected to valve cock "A". After these connections are made both valve cocks are opened and the loading process begins by passing the gasoline through the gasoline line connected to valve "B". The gas in the tank, which is displaced by the incoming liquid gasoline, is returned

Consider these Economies *of* Texas Fire Brick

You wouldn't drive 20 miles for gasoline, if you could get it a block away. If you did, you would use up about three gallons in transportation—40 miles there and back—which would be equivalent to paying a higher price. Nor would you buy a 3-ton truck to carry an average load of a few hundred pounds, for the reason that you'd be paying for more truck than you needed.

Apply the same reasoning to the purchase of fire brick and you have the basis upon which users of Texas Fire Brick are effecting decided economies. In addition they are getting a highly efficient quality product conforming to standard requirements.

Economy No. 1

Texas Fire Brick made at Malakoff, Elgin and Athens, Texas, give you close supply points effecting a big saving on freight. Texas Fire Brick thus cost you less.

Economy No. 2

In the emergency of urgent need, your phone call to the nearest Texas supply point brings your order of Texas Fire Brick, five to seven days quicker than is possible from remote manufacturing points. You gain time in getting your plant started again—and time is money. Again, Texas Fire Brick cost you less.

Economy No. 3

Texas Fire Brick Manufacturers recognize that the user is entitled to more than a filled order. Where brick of extremely high heat resistive qualities is needed, we can show you how to obtain this service without being put to the heavy expense ordinarily involved. Once more, you save substantially through Texas Fire Brick.

Tell Us Your Needs and We'll Gladly Provide You With Texas Fire Brick Economies

Texas Fire Brick Manufacturers' Association

To Promote Greater Economies Through the Use of High Grade Texas Fire Brick

Acme Brick Company
Fort Worth, Texas

Athens Brick & Tile Co.
Athens, Texas

Elgin Butler Brick & Tile
Company, Austin, Texas

Texas Clay Prod. Company
Malakoff, Texas

through valve cock "A" and the return gas line to the storage tank.

The loading process can be determined by gauging through valve cock "C". As it is desirable to have a fixed quantity or fluid level of gasoline in the tank car, which is pre-determined by the location of the lower end of overflow pipe "B", gas is passed back into the top of the dome through valve "A", thus forcing all liquid in the dome above the bottom of overflow pipe "B" back into the gasoline line and on to the gasoline storage tank. After liquid is discharged until the fluid level reaches the bottom of the overflow pipe "B" the gas itself passes out of overflow pipe "B" leaving the fluid level where desired. This system, which is essentially a "closed system" and not a "pressure system" permits the extraction of the excess gasoline put into a tank car which fills up into the dome. This is a decided and necessary improvement in the loading of tank cars over the ordinary open system which has no means provided for extracting the excess gasoline put into the tank car, which fills into the dome. Cocks "A", "B" and "C" are then closed, gas and gasoline pipes disconnected and the valve box top replaced and bolted against its seal, making the tank car ready to be moved.

Unloading Process

After the tank car has been spotted for unloading, the valve box is opened and a return gas line from the storage tank is connected to valve cock "A". Valve cock "A" is then opened to relieve any pressure that might be accumulated and save the gas or gasoline vapors that would ordinarily escape into the air. Necessary gauging and taking of samples is then done through valve cock "C" after which this cock is closed and a gasoline line for unloading is connected to the bottom outlet valve located in the bottom of the tank car.

The process of unloading is started by opening the bottom outlet valve, which has its stem extension into the valve box, from within the valve box without having to remove the tank car cover, which operation is generally necessary in standard construction as the valve stem of the bottom outlet valve is located inside of the tank car dome. No air is permitted to enter the tank car as the gasoline is removed on account of the only opening being connected to the return gas line. This process saves all of the gas given off by the casing head gasoline during its transfer.

After all liquid has been removed from the tank car all valve cocks are closed, gas and gasoline pipes disconnected and the valve box top replaced on its sealing seat to make the car ready again to be moved.

The Humble Company reports from recent tests made on installations of this improved system of loading and unloading of natural gasoline for trial that the system is successful, and a much needed improvement. The company is now equipping its casing head gasoline tank car domes with these valve boxes. The improvement is covered by a patent pending to the Humble Company.

Number One—The Incoming Gas Circuit

THE incoming gas circuit should be studied from the well to the intake scrubber tank at plant, and we must not stop by thinking it is simply a line from the well to the plant.

When we consider the full importance of this circuit we realize the line conveys the raw product from which we make our living. How necessary then it is to lay this line with careful forethought, to anticipate the troubles to which it is subject, to watch over it and constantly protect it. Let me repeat that the big idea is, the line conveys the raw product from which we plant operators make our living and is the first circuit in which we play our part in conserving the interests of our employer.

As we study this circuit, let us start at the well, and the first thing we have to know is how to take volume test to see how much gas the well will deliver in twenty-four hours, then we take a G. P. M. test to find out the gasoline yield per thousand cubic feet of gas, and in this G. P. M. test we must be able to decide whether to accept the charcoal method or the physical test car method. Knowing the result of these tests we then figure out the size of line necessary to conduct the gas.

Three Ways

There are three ways of getting gas from the well to the plant, either under its own rock pressure, at atmospheric pressure, or by vacuum, each calls for certain apparatus, the operation and maintenance of which has to be understood. In laying the line we must predetermine the depth to which it is to be buried, and take precaution for expansion and contraction of exposed sections, and above all things keep in mind the installation of drips, properly located to keep the line clear of drip. We finish the circuit by connecting the line into the intake scrubber tank at plant and I wonder if you have the function of this tank in mind? I will leave it to you but want to tell you much depends on piping this tank properly.

Assuming that the line is properly laid, we then must have a recording device to measure the gas flowing through it. To my notion, this not only measures the gas flowing through the line, but also records the money spent on which there is no return until the product from that gas arrives at destination in the tank car. The importance of proper meter installation and maintenance can not be expressed too strongly, how fortunate is the meter man who derives satisfaction in knowing his job is well done, every move he makes either earns or costs his company money. This is the way to feel about it and his every effort should be to see that the meter functions accurately so that in its accuracy it is fair to both the gas seller and purchaser. In maintenance of meter it does not rest entirely on pen arm adjustment, we must also keep in mind the orifice plate, it is not simply a plate with a hole in it, it is an accurately machined device without which the meter would be useless, and in speaking of the meter we speak of dollars and cents, so the importance of the orifice plate is not to be ignored.

In taking gas from the well we are handling a matter that affords endless study, a knowledge of the gas constituents, to understand its origin, to be able to define it, should be the aim of all plant operators. We know that a meter must be properly located to avoid pulsation. We know an obstacle in front of the orifice plate affects meter recording, study the effect of solids in the line and you will find this circuit an interesting study.

The meter man, line walker, and chart changer play an important part in watching for defective conditions on this line, in fact the meter will show any defect, any happening, through its recording, it rests with you to be able to interpret the movement of its pen arms. Much is to be thought of in this circuit, much is to be done, and in conclusion I should like to tell you of one more thing to help in the installation of any circuit, and that is the rule laid down by the management of the company for which I work, and that is, we must do our work with safety, efficiency, economy and cleanliness.

WELL TO PLANT

Here is Circuit Number One of the six that Otto Peters has found in his study of the natural gasoline plant. Whether it is a compression plant or the newer absorption type, he has divided the plant into six circuits.

Before he has finished this series, he promises to take the plant operator through the six, pointing out the importance of each. Besides that, he will point out the necessity for knowing each study.

To him the gasoline plant is the place where a man makes his living and takes care of his company's property. Are you with him?—The Editor.

Ready For Shipment!

Large quantities of finished valves and fittings, in a complete range of sizes, are constantly carried in stock for immediate shipment.

Sectional View Vogt Union Bonnet Outside Screw Globe Valve

Vogt *Drop Forged Steel Valves & Fittings*

are recommended for high pressures and temperatures of oil, gas, air, water, ammonia, and superheated steam—write for the new fitting catalog, which illustrates the complete line of Vogt Drop Forged Steel Valves and Fittings.

HENRY VOGT MACHINE CO.
INCORPORATED
LOUISVILLE, KENTUCKY

New York Chicago Philadelphia Dallas

Write for catalog

Manufacturers of DROP FORGED STEEL VALVES AND FITTINGS, WATER TUBE AND HORIZONTAL RETURN TUBULAR BOILERS, ICE MAKING AND REFRIGERATING MACHINERY, OIL REFINERY EQUIPMENT.

General view of the Keen and Woolf Oil Company's Refinery, one of the most efficient Plants of its type in the country

No Surplus Equipment Stocks for This Refinery

Patronizing supply dealers often makes saving possible

By A. R. McTee
Staff Representative

TAKING advantage of its refinery location to keep supply stocks at a minimum consistent with safe business practice is enabling the Keen and Woolf Oil Company, Houston, Texas, to effect substantial savings in its warehouse department. Because of its proximity to many supply stores, the refinery avoids a big stock of equipment, keeping on hand generally just enough material to meet present needs.

By following this plan much bookwork is eliminated; a relatively small amount of money is tied up in material on the warehouse shelves; much of the cost of a warehouse itself is done away with, since small space is required for stocks; extensive inventories are unnecessary; and only one man is needed to maintain the warehouse department.

Shelf section of warehouse

A plant located at considerable distance from the base of supplies could not profit by such a scheme as Keen and Wolf are using, but for one only a short distance removed from supply headquarters, the arrangement is sound business.

Once a week, or oftener if necessary the Keen and Woolf truck makes a trip to the supply stores for whatever equipment may be needed at the plant. The warehouseman keeps his eye on the stock and knows the items that are out, or that are likely to be needed and one or two of these are bought. In this way the stock is kept up, but without much book work. In many instances it is possible to charge an item of equipment directly from the invoice to the job where it is needed.

It is the policy at the refinery to never keep on the shelves more than one or two items of a kind, except those things that are used in great quantities, such as small valves, tees, unions, etc.

At the Keen and Woolf plant, the

(Continued on page 36.)

Arrangement of lube tanks on outside of barrel house

Outside of barrel plant showing, how barrels to be reclaimed are stacked

JENKINS CRACKING PROCESS

PRODUCES QUALITY GASOLINE

Facts from performance

HIGH QUALITY GASOLINE

is produced by the Jenkins Cracking Process because the vapors formed are immediately released from further contact with heat. It is impossible for them to be overcracked.

This is a feature exclusive with the Jenkins Cracking Process.

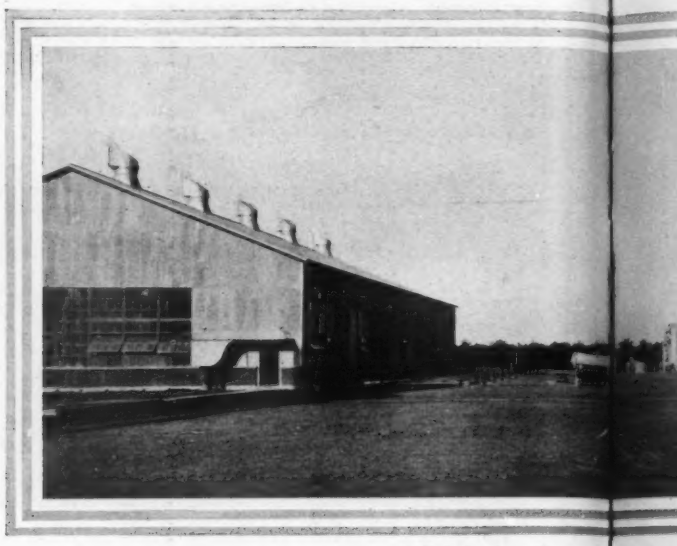
GRAVER *Founded 1857* *Corporation*

EAST CHICAGO, INDIANA

NEW YORK Grand Cent. Term. | CHICAGO Steger Building | TULSA Atlas Life Bldg. | HOUSTON West Building

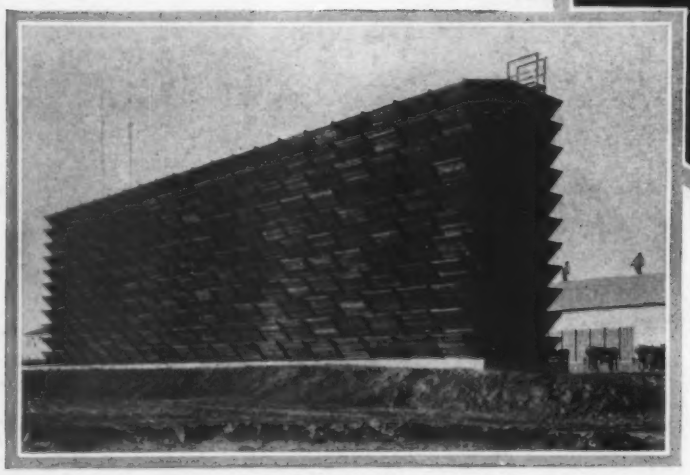
Write any office for descriptive bulletin

Tell them where you saw the ad



Compressor house and gas co
tion plant, oling to

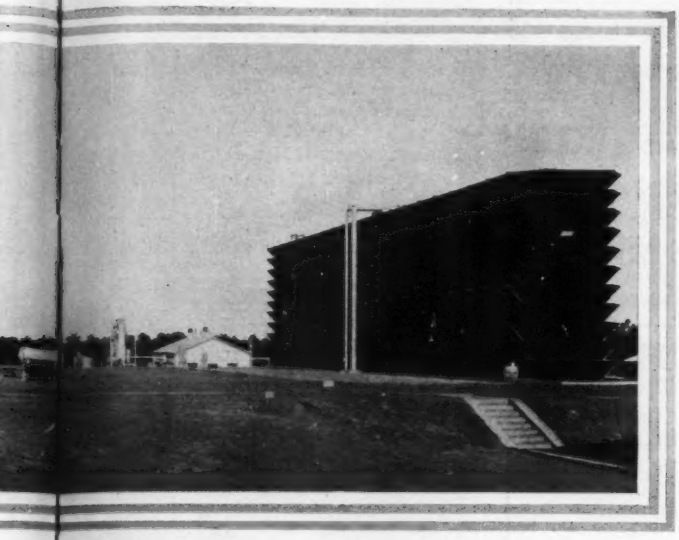
A close-up of the Braun high pressure coolers.



Braun cooling tower installed in connection with high pressure coolers.

C.F. Brau

Manufacturing M
Main Office and Facto- A
Mid-Continent District ffice



ouse and gas coolers, absorp-
n plant, oling tower.

Saving . . . . with Braun Coolers

AS COOLING in open or submerged pipe coils is fast becoming obsolete. A pipe coil installation had en decided upon for the compressor plant shown in photograph, but the gas engine manufacturer sug-sted investigating Braun coolers.

The suggestion was acted upon, with the result that aun coolers and other apparatus were installed. The rformance of the cooler group and the savings effected listed below:

rformance Data

Quantity of gas cooled	60,000,000 cu. ft. per 24 hrs.
Working pressure	450 lbs. per sq. in.
Initial temperature	220° F.
Final temperature	80° F.
Cooling water	75° F.
Pressure drop of gas	1 lb. per sq. in.

Savings

1. Approximately $5,000 was saved in first cost.

2. Miscellaneous savings were effected, such as, (a) pipe lines and fittings simplified; (b) engineering expense and time for installation reduced; (c) cost of field labor and transportation minimized.

3. At least $2,500 is saved annually on the difference in depreciation.

4. Operating costs are extremely low as no maintenance is required other than periodic cleaning.

Your problem may be of a different nature from the one we have discussed, yet you may place it in the hands of the Braun engineers with every confidence that its solution will be as satisfactory and economical.

Write for Bulletin 118.

aun & Co.

Mhanical Engineers
cto- Alhambra, California
rict fice — Tulsa, Oklahoma

Tell them where you saw the ad.

STORE HOUSE REQUISITION Date .....

KEEN & WOOLF OIL CO.

STOREKEEPER—Please deliver following material:

Purpose used .....

Estimate No. ..... SIGNED: .....
Foreman

Type of "Store House Requisition" used by Keen and Woolf. The requisition is made out in duplicate by the foreman who sends one copy to the warehouse and one to the chief clerk

FORM 7

DATE	RECEIPTS			Particulars		DISBURSEMENTS				BALANCE		
	QUANTITY	UNIT	VALUE	Order No.	Page No.	ACCOUNT	QUANTITY	UNIT	VALUE	QUANTITY	UNIT	VALUE

Type of card used by Keen and Woolf to keep card index of stock record

warehouseman is also the pipe foreman. He takes care of the machine shop and looks after the warehouse. This arrangement is made because much reclaimed equipment is handled through the warehouse and the pipe foreman has charge of working over all second hand material.

Whenever an item of new equipment is needed in the plant a form called "Store House Requisition" is filled out by the pipe foreman upon application from the particular crew needing the equipment. The original of this form goes to the chief clerk in the office; the duplicate is kept at the warehouse. The form specifies what material was asked for, what it was used for, gives its estimate number, and provides for any remarks necessary.

Through the "Store House Requisitions," the chief clerk is enabled to keep his inventory of material on the shelves up to date. When he gets the original of a requisition from the pipe foreman, he immediately transfers the information thereon to his stock record which is in the form of a card index system.

This card provides for receipts of equipment giving the date the equipment was received, the quantity, unit, value, the order number, and the page number. All this information is obtained from invoices of material bought. The disbursements column shows the account, the quantity of material in question, the unit and the value. Then there is a third column which shows the balance of this particular material or equipment in stock.

For example if three gate valves were bought the card would show the details of the purchase, in the "Receipts" column. If two of the valves should be used on line No. 8, this would be shown under "Disbursements". In the "Balance" column would be shown that one valve is still in stock at the warehouse.

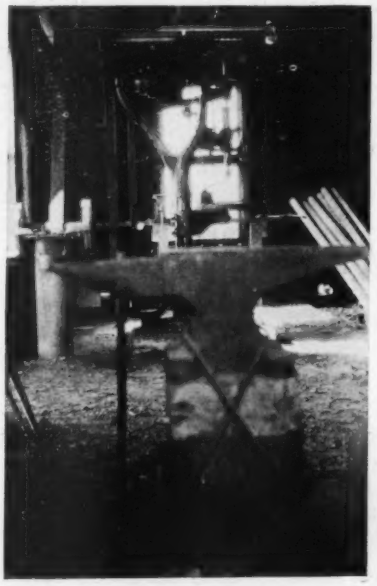
The "Office Record" card, and the "Store House Requisition" are the only forms used in the warehouse department, and comprise the bulk of paper-work to be done.

Occasionally the chief clerk goes through his cards and compiles an inventory of the stuff on hand. He then checks this against the material on the shelves to see if there is any discrepancy.

No office record is kept on the second hand material in the warehouse, the details of this equipment being left up to the pipe foreman. As it comes to the shop to be put in shape for re-use the foreman keeps track of it and makes such notations as are necessary for his own information. It is put on the shelves for used material and sent out on jobs again as requisitions come in.

Reclaimable equipment is credited to the job from which it comes and charged to the new job to which it goes.

All repair work about the Keen and Woolf plant is done by the crew. Such fittings as can be made are turned out at the machine shop. These include swedge nipples, bull plugs, steel flanges, and similar items. An electric welder is used in this work, and old material is used in the manufacture whenever available.



Interior of Machine Shop

Extraordinary efficiency is displayed in the way in which the company takes care of its barrel and drum plant. Two men operate this plant and handle, on an average of 100 barrels daily.

Whenever an order of oil is sold the buyer buys the barrels, but he has the privilege of sending them back to the plant to be reconditioned before they are filled again. Of course he pays for this work.

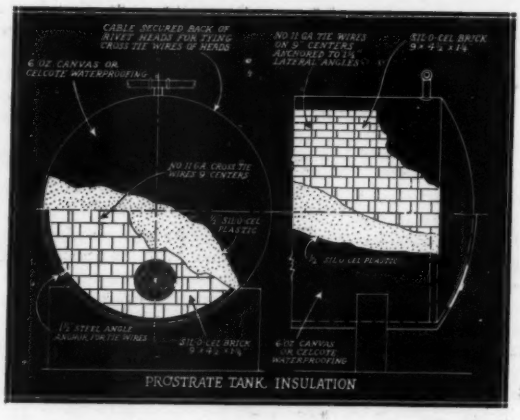
When the barrels or drums are cleaned, the old oil is first taken out with a vacuum. The barrel is then washed in a big vat of cleaning mixture, to clean the outside. The inside is then washed and whatever waste remaining is removed by the vacuum. The barrel is then dried and painted.

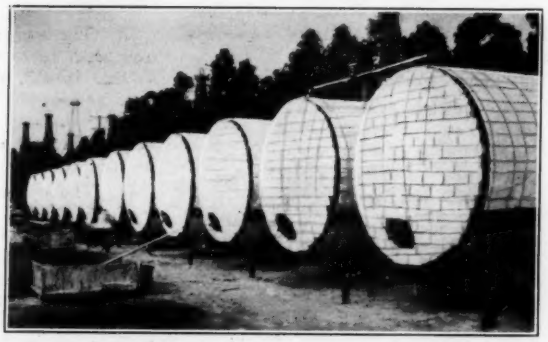
About 12 per cent of the output of the refinery goes into barrels, and the plant is now running about 2000 barrels of crude daily, making lubricating oil.

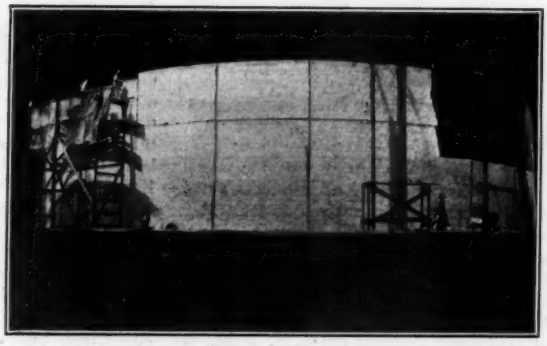
Each barrel is weighed and inspected before it is filled. Then after filling it is weighed again and the gallonage calculated by weight.

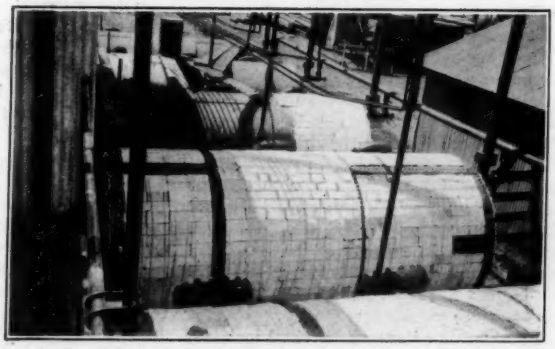
Interior of barrel house showing barrels that have recently been cleaned and painted

SIL-O-CEL
HEAT INSULATION


CABLE SECURED BACK OF RIVET HEADS FOR TYING CROSS TIE WIRES OF HEADS
6 OZ. CANVAS OR CELCOTE WATERPROOFING
NO 11 GA. TIE WIRES 18" O. CENTERS ANCHORED TO 1½" LATERAL ANGLES
SIL-O-CEL BRICK 9 x 4½ x 1¼
NO 11 GA. CROSS TIE WIRES 9" CENTERS
½" SIL-O-CEL PLASTIC
1½" STEEL ANGLE ANCHOR FOR TIE WIRES
SIL-O-CEL BRICK 9 x 4½ x 1¼
6 OZ. CANVAS OR CELCOTE WATERPROOFING
PROSTRATE TANK INSULATION







Making Tanks Heat-tight as well as Oil-tight

THE insulation of absorbers, blending tanks for cylinder stocks and greases, and storage tanks for asphalt and other heavy residues will save seventy per cent of the heat normally lost from their exposed surfaces. The steam or fuel savings thus effected are in proportion.

Besides reducing steam consumption, insulation also promotes easier temperature control and more uniform heat distribution.

A Simple Method

Tanks and other metal surfaces are ordinarily insulated with Sil-O-Cel "split brick," cemented on, anchored, and sheathed with plastic Sil-O-Cel as shown on the drawing above. Celcote water-proofing or painted canvas provide a weather-proof covering.

The Sil-O-Cel brick employed have many other uses in the absorption plant and refinery. They are built into furnace walls, used to line boilers and retorts, installed in still settings and over their tops—to reduce heat waste. Sil-O-Cel is supplied also in the form of block, powder, cement and coarse-burned aggregate for making insulating concrete, meeting every high temperature insulating requirement.

CELITE PRODUCTS COMPANY

11 BROADWAY · · NEW YORK
53 W. JACKSON BLVD · CHICAGO
VAN NUYS BLDG · LOS ANGELES
MONADNOCK BLDG · SAN FRANCISCO
OFFICES AND WAREHOUSES

CELITE PRODUCTS · LIMITED
NEW BIRKS BLDG · MONTREAL · QUE.
CELITE PRODUCTS CORPORATION
WINDSOR HOUSE · LONDON · S·W·1
IN PRINCIPAL CITIES

Tell them where you saw the ad.

New Specifications for Natural Gasoline

Tulsa, Okla.—The new specification card of the Association of Natural Gasoline Manufacturers is being mailed from the office of A. V. Bourque, the secretary.

The specifications are printed on a cardboard folder, which can be inserted under the glass cover of a desk and thus kept available for instant notice.

The card specifies color, sampling, grades and the coefficients of expansion table.

The new specifications are as follows:

Grade "Double A"	
Recovery	Not less than 90%.
End Point	Not over 375°F.
Gravity	80.0 to 87.9° Be.
Grade "A"	
Recovery	Not less than 90%.
End Point	Not over 375°F.
Gravity	72.0 to 79.9°Be.
Grade "Double B"	
Recovery	Not less than 85%.
End Point	Not over 375°F.
Gravity	84.0 to 92.0°Be.
Grade "B"	
Recovery	Not less than 85%.
End Point	Not over 375°F.
Gravity	76.0 to 83.9°Be.
Grade "C"	
Recovery	Not less than 78%.
End Point	Not over 375°F.
Gravity	80.0 to 90.0°Be.

Color.—The color of all products must be plus 25 Saybolt chromometer. All tests are to be made in accordance with the latest approved methods of the American Society for Testing Materials. That portion of the tentative method of distillation test for Natural Gasoline, adopted June, 1925, by the A. S. T. M., is quoted insofar as procedure is concerned.

Sampling.—Samples should be collected in a previously cooled bottle, preferably by immersing the bottle in the liquid, where possible, and discarding the first sample. Where immersion is not possible the sample should be drawn off into a previously cooled bottle in such a manner that agitation is kept at a minimum. Immediately close the bottle with a tight-fitting stopper, and place in an ice bath or refrigerator capable of bringing the gasoline to a temperature of not less than 32 degrees F (O°C.), nor more than 40° F. (4.45°C.)

(a) The condenser bath shall be filled with cracked ice (any other convenient cooling medium may be used) and enough water added to cover the condenser tube. The temperature shall be maintained between 32 and 34°F. (0 and 1.1°C. Agitation with air greatly aids in maintaining the required temperature range.

(b) The condenser tube shall be swabbed to remove any liquid remaining from the previous test. A piece of soft cloth attached to a cord or copper wire may be used for this purpose.

(c) One hundred cubic centimeters of the product shall be measured in the 100-cc. graduated cylinder at 32 to 40°F. (0 to 4.45°C.) and transferred directly to the Engler flask. Both the flask and the graduated cylinder shall have been cooled to a temperature of from 32 to 40°F. (0 to 4.45°C.) before use. None of the liquid shall be permitted to flow into the vapor tube.

(d) The tremometer provided with a cork shall be fitted tightly into the flask so that it will be in the middle of the neck and so that the lower end of the capillary tube is on a level with the inside of the bottom of the vapor outlet at its junction with the neck of the flask.

(e) The charged flask shall be placed in the 1¼ in. (3.175-cm.) opening in the 6 by 6-in. (15.24 by 15.24-cm.) asbestos board with the vapor outlet tube inserted into the condenser tube. A tight connection may be made by means of a cork through which the vapor tube passes. The position of the flask shall be so adjusted that the vapor tube extends into the condenser tube not less than 1 inch. (2.54-cm.) nor more than 2 inches (5.08-cm.).

(f) The graduated receiver used in measuring the charge shall be placed without drying, at the outlet of the condenser tube in such a position that the condenser tube shall extend into the graduate at least 1 inch (2.54-cm.) but not below the 100-cc mark. The graduate shall be immersed at least up to the 100-cc. mark in a transparent bath maintained between the temperatures of 32 and 34°F. (0 and 1.11°C.) The top of the graduate shall be covered closely during the distillation with a piece of blotting paper, or its equivalent, and cut to fit the condenser tube tightly. A lead washer, or other suitable material, resting on the blotting paper is a convenient accessory as it serves to hold the paper tightly against the top of the graduate and also provides the additional weight necessary to overcome the buoyant effect of the liquid in the cooling bath.

When everything is in readiness, heat shall be applied at a uniform rate, so regulated that the first drop of the condensate falls from the condenser in not less than two nor more than five minutes. When the first drop falls from the end of the condenser, the receiving cylinder shall be moved so that the end of the condenser tube shall touch the side of the cylinder. The heat shall then be so regulated that the first 10 cc. of distillate shall be recovered in not less than three nor more than four minutes. Thereafter, the rate of distillation shall be maintained uniformly at not less than four nor more than 5 cc. per minute. The reading of the distillation thermometer shall be recorded when the level of the distillate reaches each 10-cc. mark on the graduate.

When the liquid residue in the distillation flask is approximately 5 cc., the heat may be increased because of the presence of heavy ends which have relatively high boiling points. However, no further increase of heat shall be applied after this adjustment. The 4 to 5 cc. rate cannot always be maintained from this point to the end of the distillation, but in no case should the period between the point when approximately 5-cc. of the liquid remains in the flask and the end point be more than 5 minutes.

The heating shall be continued until the mercury reaches a maximum and starts to fall consistently. The highest temperature observed on the distillation thermometer shall be recorded as the end point. Usually this point will be reached afteh the bottom of the flask has become dry. If the bottom of the flask is not dry, the operator should note this on his report.

The total volume of the distillate collected in the receiving graduate shall be recorded as the "recovery".

The cooled residue shall be poured from the flask into a small cylinder graduated in 0.1 cc., measured when cool, and the volume recorded as "residue" at 32 to 40°F. (0 to 4.45°C.)

The difference between 100 cc. and the sum of the recovery and the residue shall be calculated and recorded as "distillation loss".

NOTE—Complete description of apparatus can be found in 1925 Report of Committee D-2 on Petroleum Products and Lubricants, American Society for Testing Materials, obtainable from the Society at 1315 Spruce Street, Philadelphia, Pa.

Coefficients of Expansion Table

Following is the list of the Coefficients of Expansion for respective groups of Petroleum Products.

The complete table, Circular 154 and the abridged table, Circular 160, have been adopted by the Bureau of Mines, Bureau of Standards, American Society for Testing Materials and American Petroleum Institute, Western Petroleum Refiners Association and our organization.

Complete copies of the tables may be secured from the Department of Commerce, Bureau of Standards, Washington.

Group No.	Gravity Range of Group	Coefficients of Expansion at 60° F
I	up to 34.9	.0004
II	35 to 50.9	.0005
III	51 to 63.9	.0006
IV	64 to 18.9	.0007
V	79 to 88.9	.0008
VI	89 and higher	.00085

All products shall be shipped according to regulations of the I. C. C., which follow the Bureau of Explosives regulations and methods of tests. The I. C. C. regulations provide as follows in regard to vapor tension:

Paragraph 412, (a) Casinghead Gasoline—Liquid condensates from natural gas or from the casinghead gas of oil wells, made either by the compression or

A.P.I. Hydrometers

GRECO Hydrometers are calibrated to read "Degrees A.P.I." which is the designation adopted by the American Petroleum Institute, Bureau of Mines and Bureau of Standards for the oil-Baume scale based on the modulus 141.5. The ranges indicated on accompanying list are sufficient for all oil testing requirements. Write us if in doubt which type is best for your purpose.

PRICE LIST

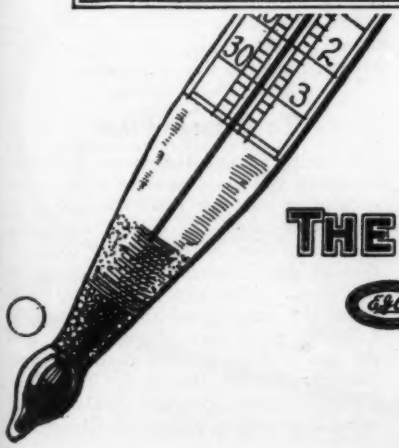
Subject to Discount on Quantity Purchases

0840	Specifications
TYPE	Usual Form without Thermometer.
LENGTH	Approximately 12 Inches.
BALLAST	Mercury Filled.
CALIBRATION	60 Degrees Fahrenheit.
SCALE	Graduated in 1/10° A.P.I.
RANGE	Twelve Degrees A.P.I. Standard Ranges: 10-21° 39-51° 69-81° 19-31° 49-61° 79-91° 29-41° 59-71° 89-100°
PRICE, EACH	$2.75.

0860	Specifications
TYPE	Usual Form with Thermometer.
LENGTH	Approximately 15 Inches
BALLAST	Shot Filled.
CALIBRATION	60 Degrees Fahrenheit.
SCALE	Graduated in 1/10° A. P. I. Thermometer and Correction Scale.
RANGE	Twelve Degrees A.P.I. Standard Ranges Indicated under 0840.
PRICE, EACH	$5.00.

0852	Specifications
TYPE	Short Form without Thermometer.
LENGTH	Approximately 6 Inches.
BALLAST	Mercury Filled.
CALIBRATION	60 Degrees Fahrenheit.
SCALE	Graduated in 1/4° A.P.I.
RANGE	Twelve Degrees A.P.I. Standard Ranges Indicated under 0840.
PRICE, EACH	$2.25.

0872	Specifications
TYPE	Short Form with Thermometer.
LENGTH	Approximately 6 Inches.
BALLAST	Shot Filled.
CALIBRATION	60 Degrees Fahrenheit.
SCALE	Graduated in 1/4° A.P.I.
RANGE	Twelve degrees, A.P.I. Standard Ranges Indicated under 0840.
PRICE, EACH	$4.75.



THE EMIL GREINER COMPANY

Chemical Glassware, Laboratory Supplies and Chemicals

55 VANDAM ST., NEW YORK, N. Y.

Tell them where you saw the ad

NEW EQUIPMENT, CATALOGS, BULLETINS, BOOKS

Waste Meter Measures Fuel Loss Up Chimney

It has been stated by good authority that the largest loss in any boiler plant is the heat wasted up the chimney. For measuring this important loss, the Uehling Instrument Company, Paterson, New Jersey, has perfected a recording instrument known as the Waste Meter. With its aid, the fuel waste may be readily determined either in dollars and cents or in B. t. u., or in per cent of the fuel burned during any time interval.

This waste meter embodies several unique features, such as the entire absence of moving parts, rubber connections or special glassware. It employs no chemical solutions, and is self-checking for accuracy. The records are made almost instantaneously and are continuous.

Temperatures of the escaping flue gases and their percentage of carbon dioxide are recorded on the same chart. The corresponding fuel loss for any carbon dioxide content and temperature may be read directly from a table furnished by the manufacturer. One especially important advantage of having the carbon dioxide and the temperature recorded on the same chart is that the engineer is thus enabled to determine whether special efforts were made to increase the carbon dioxide during heavy firing periods, when the temperature naturally rises.

With the aid of the carbon dioxide record, it is comparatively easy for the fireman to control the air supply in order to keep the carbon dioxide fairly constant at any desired percentage. The temperature of the flue gases, however, is dependent upon the rate of driving the boiler, the cleanliness of the boiler heating surfaces and the condition of the baffles. Hence the pyrometer record shows when the soot is blown, when scale is removed from the boiler and it also shows up bypassing of the gases due to leaky or broken-down baffles.

A complete mechanical description of the meter with literature will be mailed upon request to the company.

Time Saving Is Big Feature Of Petroleum Calculator

A petroleum calculator designed to save the oil man's time has recently been put on the market by the Refinery Supply Company, Tulsa, Oklahoma. This instrument is called the Fraser Petroleum Calculator.

The Fraser Calculator employs the A. P. I. scale and standards. For gravity correction all one must do is to put the indicated temperature on the mobile arm opposite the indicated gravity and the correct gravity may then be noted opposite 60 degrees F. At the same time the gravity at any other temperature may likewise be noted.

For volume deduction, the method is equally simple but one must employ the segment in which the gravity of the oil under consideration properly falls, in other words one must know the gravity of the oil before he can find the proper deduction. Having found this gravity (at 60 degrees F.) the mobile arm is moved until zero degrees F. in the correct segment and the per cent of volume to deduct is then opposite the indicated temperature.

The two outer scales of the indicator are employed as above described, but it is often desirable to know the specific gravity, corresponding to Baume degrees. For this purpose an additional inner Baume scale is given. By using either edge of the mobile arm as a straitedge, the corresponding specific gravity may be found, likewise the pounds to U. S. gallon and the gallons to 100 pounds at various Baume gravities.

Further information on the calculator can be had upon application to the company.

Building Booster Plant

Breckenridge, Texas.—An additional compressor booster unit is being added to the Mid-Kansas Oil and Gas Company's Tullos plant in Stephens County and at the Texas Pacific Coal & Oil Company's plant at Strawn in order to make delivery of residue gas recently contracted for by the Lone Star Gas Company. Four million cubic feet of residue gas will be purchased daily from each of these two plants by the Lone Star Gas Company, and to make deliveries into the main line necessitates a booster unit to bring the intake pressure up to 35 pounds. The two plants are operating on 17 pounds pressure.

Heat Transfer Equipment

A quick-reference folder on heat transfer equipment has recently been published by The Griscom-Russell Company, 90 West Street, New York.

This folder briefly describes condensers, heat exchangers, gas and water coolers, evaporators, oil heaters, separators and regulating devices particularly adapted to oil refinery service and includes references to bulletins in which these units are more fully discussed. Copies may be obtained by writing direct to the manufacturers.

To Enlarge Plant

Ranger, Texas.—Hagaman Refining Company is to add another unit to its absorption gasoline plant located near Ranger in order to handle new gas made available by the recent completion of gas producing wells close to the plant. The new equipment will bring the capacity of the plant up to 1,500,000 cubic feet of gas daily, and the gas is yielding more than two gallons gasoline per thousand. The Hagaman Refining Company is also operating a skimming plant near Ranger.

absorption process, alone or blended with other products, must be described as casinghead gasoline when the vapor pressure at 100°F. (90°F. Nov. 1 to March 1) exceeds 10 pounds per square inch, and does not exceed 20 pounds. Such products must be shipped in insulated class 4 tank cars.

Paragraph 412. (c) When the vapor pressure of such condensates or blends does not exceed 10 pounds at 100°F. (90°F. Nov. 1 to March 1), these condensates or blends must be described as gasoline. Such products may be shipped in ordinary Class 2, or Class 3 tank cars, or in insulated Class 4 tank cars.

Specifications Committee — John M. Hall, Chairman; L. F. Bayer, A. F. Wood, E. R. Lederer, G. P. Bunn, J. R. Jarvis, S. B. Crooks.

Titusville Steel Storage Tanks

Made of the best open hearth homogeneous steel, carefully riveted, caulked, tested and painted before shipment. These tanks are well made, by skilled workmen in a modern shop where only the highest quality of materials are used.

All Titusville Tanks are tested to 50 per cent in excess of working pressure desired, employ pressed steel tap flanges, cast iron flanged nozzles and reinforced tapping throughout.

Let Us Serve You

The TITUSVILLE IRON WORKS Co.
TITUSVILLE • PENNA.

TITUSVILLE EQUIPMENT
Oil Country Boilers
Steam Drilling Engines
Tico Gas Engines
Flapper Valve Pumps
Pumping Powers
Twin Drilling Engines
Rotary Machines Rotary Drawworks
Swivels Slush Pumps
Crown Blocks
Traveling Blocks
Rotary Drilling Specialties

TITUSVILLE OIL COUNTRY MACHINERY
RUGGED - ENDURING

AFFILIATED COMPANIES FOR DISTRIBUTION
For Mid-Continent, Eastern, Western and Coastal Fields:
The Continental Supply Co.
Titusville Machinery carried in stock at all Field Stores
For Export:
The Continental Well Supply Company,
No. 2 Rector Street
N. Y City

Why Jobbers Would Build a Modern Refinery

(*Continued from page 13*)

sight over the next five or ten years, a sufficient and safe supply of gasoline for you and me, and it is you and I with which I am concerned at this particular time. I am not concerned with the fact that the public can secure gasoline. I think they will be able to get all the gasoline they want. I am concerned with who is going to sell them gasoline and I am forced to conclude that unless I can take steps to assure myself an adequate supply of gasoline at a competitive price, that while the public will get its gasoline in ample quantities, it will not be buying it from me. Since my aim is to stay in this gasoline business for the next ten years, I cannot take seriously the criticism because there are now too many gasoline plants there is no reason for our duplicating the facilities.

High and Low

"What is the real situation in which we find ourselves as jobbers? We buy gasoline from a manufacturer, whose cost of producing it is from 2 to 5 cents a gallon greater than the cost of his big competitor. We buy on this high market, we pay the same freight rate and delivery cost, and we sell on a market rigidly and completely controlled by the largest distributor in the territory, a competitor who can if he wishes and if he finds it necessary or to his own interest, sell gasoline in our territory at less than it costs us to lay it down at our bulk stations, and because of his greatly reduced price of manufacture still operate at a small profit, while we are being eliminated.

"Last summer, when you were paying 13 cents a gallon for gasoline in Group 3, and when the small refiner without modern facilities was barely making a profit on his product, our great competitors, who produce, refine and distribute gasoline, were undoubtedly producing gasoline for 8½ or 9 cents per gallon. This is not an accurate figure. I don't know what their production costs are, but I am assuming this to be correct, and I ask you this—if they were not able to produce gasoline at about this figure, how does it come about that the great integrated refiners are able to dump on the market gasoline below the spot market price, break the spot market wide open and flood the jobbers with constantly reducing quotations for gasoline?

Who Does It?

"Who breaks the spot market? Did you ever stop to consider? Does the refiner from whom you buy, who operates a skimming plant, break his own market? I ask you again—do you believe any great organization, offering gasoline continually lower than the spot market, is selling this gasoline at a loss to himself? Do you believe that the great organizations are unwise enough to create a market for themselves which will be less than the cost of production? It is an amusing situation.

"When gasoline breaks from 12 or 13 cents to 9 cents a gallon the great organizations put out the propaganda that gasoline is now selling below the cost of production, and I guess they are right, but they are not referring to their own cost of production. They are referring to the cost of production of the other fellow. Who broke the spot market in 1923? Who sold the Governor of South Dakota 20 carloads of gasoline at 9 cents, when you were paying as high as 14 cents? Do you think they sold this 20 carloads at less than cost of production, merely for the pleasure of transacting the business, and do you believe that they continued to dump on the spot market gasoline at 9 cents and 8 cents and continually lost money on the transaction? And while they were right in saying that the gasoline was being sold at less than the cost of production, it was not less than their cost of production, although it may have been a ruinous figure for their competitors.

The Reason

"No reason, they tell us, for building a refinery for ourselves! To my mind there is at least one great and outstanding reason, and that is to save our own lives, and when I get to a point where the doctor tells me I am going to die unless I have a major operation performed, much as I dislike an operation, I am going to give it a try in the hope that I may cheat the undertaker. I find myself in precisely that position in my business today. I must undergo a major operation or take a chance on the flowers and the singing at my house. Which may be a trifle mixed, but I think you see what I mean.

"We have been living in a fool's paradise. We have been buying and selling gasoline on a margin which enabled us to make a living, and we have been unaware that the natural workings of economic laws are progressing to a point where we will be eliminated from the industry without we take steps to change the situation. And no one has offered to save us from the ultimate disaster. Our friends, who operate modern refineries, have not come forward with any plan which will save us from what they themselves know is a situation which will eventually eliminate the independent jobber.

No Plan Offered

"Had some of our friends, who operate modern plants and who presume to criticise the plan for the reasons stated, come forward with a workable plan, which would have been fair to them and fair to us, which would protect their outlet into our stations and protect our source of supply, such a plan could then have been some substantial reason for the criticism which they offer. But since no one felt impelled to make this move and since every refiner operating a modern plant was willing to make every dollar of profit made possible by his modern facilities, and because we were forced to buy at a fictitious price and sell on a rigid market, we have been compelled to undertake the major operation.

"The engineers are now studying the plan and have promised to submit to us within the next ten days or two weeks a complete set of figures which will tell us exactly what we can expect to do and at what price we can expect to produce gasoline at our own plant. When these figures are fully available they will be submitted to the members of the industry and a plan will be ironed out and offered, not so much as a money making proposition, but as a means of saving the lives of those who are wise enough and fearless enough and independent enough to make the effort.

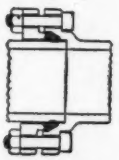
"The whole trouble with us in the past has been our refusal to face the facts before us. The trend of events in our industry has been so clear that the wayfaring man, e'en tho' a fool, need not err therein, and yet we have shut our eyes to the situation and have gone on, month after month and year after year, believing and hoping and perhaps praying, but the hopes were not realized and the prayers were fruitless.

"So now at last we face a fact, whether we will or not, and the fact is this—that unless we save ourselves we shall not be saved. It has seemed to some of us that the only means within our power for saving ourselves was the construction of our own plant and the manufacture of our own products at a price which would enable us to compete with the largest refiner and distributor who operates in our territory."

Thermometer Bulletin

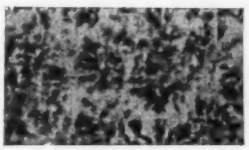
Bulletin No. 148, recently issued by The Foxboro Company, Inc., Foxboro, Mass., completely describes Foxboro indicating thermometers and gives illustrations of each type and model. Copies of the bulletin may be had for the asking.

SIMPLEX CAST IRON CONDENSER PIPING

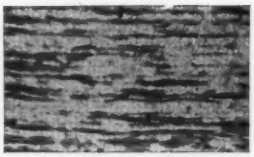


"ONE FLANGE IS LOOSE"

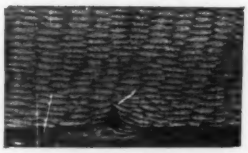
COATS ITSELF



Photomicrograph of cast iron, much enlarged, showing granular structure.



Photomicrograph of wrought iron, much enlarged, showing fibrous structure.



A piece of sheet steel, much enlarged, showing surface and sectional structure with a typical pit.

AUTHENTIC data from over 250 years of service prove that cast iron becomes coated with rust but remains practically unimpaired in weight and strength under conditions that are fatal to other kinds of metal.

Scientists believe this phenomena due to the microscopic structure of cast iron —a structure of the same granular or crystalline form as found in the iron ore from which it is made and which has laid unimpaired in the ground for untold centuries. Cast iron rusts on the surface, but the corrosive agent fails to break the natural mechanical bond between the irregular shaped granules, further oxygen is excluded by the first rust coating, and therefore corrosion stops. Cast iron literally coats itself.

In place of the interlocked grains or crystals of cast iron, wrought iron and steel are of a fibrous and, in thinly rolled steel, of a laminated structure, with distinct leaves overlapping each other. As corrosion takes place, these leaves or fibres scale off, constantly presenting a fresh surface to the corrosive agent.

Simplex pipe is flanged pipe minus the limitations of a joint made with rigid flanges. Thousands of feet of this material has been in use for years by the leading oil refineries of the United States for oil condensers.

Write for Simplex Condenser Catalog Number 55

AMERICAN CAST IRON PIPE COMPANY

General Offices and Foundry: Birmingham, Ala.

Branches at
Dallas, Kansas City, San Francisco, Los Angeles, Chicago, New York,

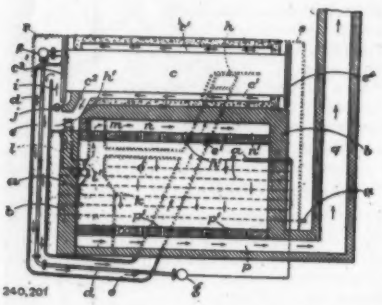
Write Also for information on Our Prepared Joint Cast Iron Pipe for Oil Lines

EXTRACTS OF REFINING TECHNOLOGY

Cracking Mineral Oils.—One of the principal disadvantages of the cracking process lies in the local overheating of the stills in which the process is carried out and the attendant bad effects of this phenomenon. According to the process which is described in British Patent No. 240,201 this disadvantage is done away with by the use of the apparatus which is shown in the accompanying illustration.

In this apparatus the furnace gases are divided into two parts, one part passing into a circuit of flues and displacing a corresponding amount of circulating gases, while the other part is cooled by dilution with the displaced gases, and is passed through other parts of the apparatus.

A preheater, a, is mounted in a setting, b, and the cracking tubes, d, which are of relatively small diameter



are arranged in the flue, e, while their upper ends are connected to a header, f, communicating with a chamber, e, in which the treated oil remains for a predetermined time in order to permit its conversion into lighter products. The oil is supplied from the preheater, a, to the tubes, d, through a header, g. The flue e is extended upwards at e^1 into the annular space c^1 surrounding the chamber c.

The upper end of the flue e communicates with the chamber h^1, which also receives circulating gases from the space c^1 through a passage c^2. The hot gases from the furnace k are admitted through a flue 1 laterally into the chamber h^1. A damper 1^1 in the flue 1 is thermostatically controlled and cooled. The main outlet flue m of the furnace communicates with the flues immediately above the preheater, and also through a flue o with the flue e^1.

The flue o allows the cooler gases which are displaced by the admission of hot gases into the circuit to pass into the main outlet m. The hot gases are thus diluted and cooled before their passage into the preheater a through the ports n^1. These gases escape into the flue p and chimney q. Local overheating and carbonization in the preheater a, is thus avoided. The heating gas circuit comprising the flues i, e, e^1 c^1 and c^2 is thus in communication with the furnace k only through two small flues 1 and o.

* * *

The Tar Number and the Evaluation of Transformer and Turbine Oils.—Mineral oils, particularly the transformer and the turbine oils, consist of methane and napthene oils. They are not resistant to oxidation. The reaction products that are obtained in this manner consist of complex mixtures which are dependent on the reaction temperature and the degree of refining to which the oils are subjected. Due to the action of the oxygen in the air there result high molecular weight organic acids, the so-called asphaltogenic acids, polymetization products and oxidation products such as the asphalts and carbon. The totality of the decomposition products is known as transformer slime.

The reaction products are classified according to the Rodman scheme. A distinction is made between the slime that is soluble in oils and that which is not. Other publications will be made on this subject.

It was furthermore shown that the tar member is not suitable for determining the value of insulating oils, as this coefficient only expresses the acid reaction products that are found in the slime. A number of curves are given in the original article and from them it is possible to see that the formation of slime commences at that point when the formation of acid stops. This observation has been confirmed by various American investigators. At best what can be gathered from observation is that the formation of slime has nothing to do with the tar number of the oil, when an extreme case is being considered, as for example the oxidation of a white oil or of a paraffine.

In the first case a blown oil gave a tar number of 0.93 percent, one treated with sodium peroxide a tar number of 0.12 percent, but on the other hand when the oil was treated for one thousand hours in the air at a temperature of 112 degrees C there was no trace of slime formed. The author of the article, which is found in Zeitschrift fuer angewandte Chemie, 38, pages 476-81, 1925, states that after many years of observation and experimentation he has come to the conclusion that as the degree of refining of the oil increases the tar number is reduced up to a certain point, and then it rises again, and this relationship is to be sure quite different for different varieties of mineral oils. In the article there are also contained data on turbine oils. In this case the formation of emulsions and therewith a reduction in the lubricating power of the oil plays an important role.

* * *

Distillation of Sulphur Containing Oils.—An interesting article has been published on the distillation of sulphur-containing petroleums in the German journal, Brennstoffechemie, volume 6, pages 22-25.

It is stated therein that the rule which was propounded by Mabery that the sulphur in the distillate and in the residues is distributed according to the specific weight is found to be incomplete. When no decomposition or cracking takes place during the distillation, the sulphur content of the distilates rises with the specific weight, and when a slight degree of cracking takes place it is found that the higher fractions first are less concentrated in sulphur compounds. The properties of the crude oil are also of importance in this consideration, as in the different petroleums there are different proportions of sulphur compounds—as well as in the distillates and also in the distillation residues.

* * *

Furnace for Distillation of Bituminous Shale.—The high fuel consumption of the Scottish shale furnaces and the fact that the furnaces which are used by Messel in Germany give good results only with rich material yielding larger proportions of gas of high calorific value, render furnaces of this type unsuitable to the distillation of the low grade ichthyolic bituminous shales of Italian origin. For these materials a furnace is employed which is composed of three zones, the uppermost having the smallest and the lowest the greatest cross-section. From the top zone, in which the shale undergoes preliminary heating and true distillation, the vapors and gases are led through two pipes joined outside through a cock, this allowing of regulation of the draft. The residue at about a temperature of 500 to 550 degrees C descends to the second zone, where it meets the air current from below. In this place the fixed carbon undergoes true combustion and the temperature rises to 700 to 750 degrees C. In the lowest zone the heat of the exhausted material is recovered by the air and steam. The bottom of this zone is sealed hydraulically and as the water becomes heated, to a temperature of 70 to 80 degrees C, steam is emitted and carried upwards in the air blast.

For further details see Annali Chim. Appl., 1925, volume 15, pages 273-83.

* * *

Determination of Various Hydrocarbons in Petroleum Distillates.—A discussion of the methods used in analyz-

(Continued on page 49.)

Pipe Bends for BIG Work!

A complete line of Valves and Fittings in Brass, Iron and Steel for all pressures and purposes is made at our Valves and Fittings Works, Greensburg, Pa. Write for catalogue.

The main arteries in any piping system call for more than usual care in their making.

Any appeal for such work must be based on an ability to produce that knows no compromise. Accurate designing, quality materials, plant equipment to meet modern needs and workmanship of the most experienced kind, all these combine to make K & J stand for everything you will demand in fabricated work of unusually large size.

Estimates furnished on request.

THE KELLY & JONES CO.

OWNED BY WALWORTH COMPANY

PIPE FABRICATING SHOPS - ETNA, PA.

Tell them where you saw the ad.

More Powe
in 192

A hundred and sixty
wish from th

Clark Compr
Drilling

wer to You 926!

ixty-five horsepower m the home of

pressors and g Engines

Buy Tank Cars Now!

SOME of our good friends among the oil shippers may wish they had paid more attention to the last "Car Foundry" advertisement in these columns under the heading "Don't Get Caught Short of Tank Cars."

BECAUSE we took our own advice and prepared the shops for a rush of orders, we are still able to make fairly prompt deliveries. Many inquiries are coming in, however, and those who act quickest will get their cars first. We will help you all we can, but don't put off buying too long. Even though prompt shipment may not be essential, we suggest placing orders at once, to protect against higher prices.

American Car and Foundry Company

165 Broadway
New York

Railway Exchange Building
Chicago

915 Olive Street
St. Louis

Always Get a "Car Foundry" Quotation

EXTRACTS OF REFINING TECHNOLOGY

(Continued from page 44.)

ing the distillates that are obtained in the distillation of crude oil and tar and a description of an approved method for determining the proportions of olefinic hydrocarbons, aromatic hydrocarbons and saturated hydrocarbons in these products are contained in the publication entitled Ann. Mines Roumanie, 1925, volume 8, six pages.

The methods that have been previously described are suitable only for use with fractions which are volatile in steam, in other words those that have boiling points up to approximately 150 degrees C. For determining olefines in factions which have higher boiling temperatures, an apparatus is employed which consists of a vessel which is similar to a cylindrical separator funnel, to the upper part of which is connected a graduated burrette tube and which is also provided with a sealed-in side tube projecting downwards nearly to the bottom of the vessel. From fifty to sixty cubic centimeters of a thirty percent solution of sodium hydroxide are run into the vessel and about one-half of it is run out, thereby drawing in twenty-five cubic centimeters of the oil under test through the burette tube.

The mixture is cooled down to a temperature of minus 10 to minus 15 degrees C by immersing the apparatus in a freezing mixture of salt and ice, a stream of oxygen containing from one to three percent ozone is passed in through the side tube for a period of six hours at the rate of five liters per hour. Then the apparatus is permitted to stand for a period of 12 to 14 hours at the ordinary temperature until all the precipitated oxonide has disappeared, and both layers are clear. After drawing off the alkaline layer the oil is washed successively three or five times with a similiar solution, two or three times with distilled water, once with a fifteen percent solution of sodium bisulphite, and finally with distilled water, after which it is forced into the burette tube by running water into the vessel through the side tube. Its volume in the burette tube is then read after being allowed to stand for a period of three hours. Cyclic saturated hydrocarbons are determined by the method which has been described above. The presence of solid material and compounds containing sulphur or nitrogen affects the accuracy of the method.

* * *

Hydrocarbon Oils as Insulating Media.—In a recent meeting of the Manchester, England, section of the Society of Chemical Industry, there was delivered an interesting talk on some lesser known properties of the hydrocarbon oils which are used as insulating media. In this paper there were described the experiments which were conducted over a period of years and which had for their object the determination of the stability of mineral oils used in electrical switches and transformers for insulating purposes. It was pointed out that such oils were liable to undergo oxidation in the presence of air, and that this was facilitated by the immersion in them of copper and other similar metals. This oxidation showed itself in the production of acid and a solid deposit and a greatly reduced insulating value.

* * *

Refining Oils.—Commercial grades of benzine, petroleum, crude lignite and coal tar are purified and made resistant to light and to air by subjecting them to a treatment in which they are heated with or without pressure with a gas, for example air, at a temperature of 150 to 400 degrees C and at a pressure of 20 to 75 atmospheres. This treatment serves to polymerize the unsaturated hydrocarbons. Catalysts such as water, acids, alkalis, metals or metallic compounds can be employed to change the nature of the polymerization residues. British Patent No. 226,188.

GARLOCK

Confidence

"That in Which Faith is Put or Reliance Had"

The Plant Manager, Chief Engineer and other Operators know they will receive a continual flow of production power from Mechanical Units packed with Garlock Packing. There will be no cessation of operation through Packing Failures. This state of mind is characterized by reliance in the commodity and is summed up as Confidence.

The Confidence Factor in Garlock Packings, is the result of a manufacturing and service policy, established nearly a half century ago, to supply only "Quality Controlled" products and to guarantee them to give complete satisfaction.

THE GARLOCK PACKING COMPANY

Manufacturers of GARLOCK PACKINGS

PALMYRA, N.Y.

Sales Offices in all Principal Industrial Centers

The Standard Packing of the World

RECENT REFINERY PATENTS

BY STAFF REPRESENTATIVE

Washington, D. C.—The following patents of interest to the refining industry were granted by the United States Patent Office during the month of November:

No. 1,559,701, granted November 3 to Leon E. Hirt, Los Angeles, Calif., for a method of distilling oil, comprising producing a flow of the oil in thin films through a series of tubes in which the distillation takes place and pressing a gaseous medium other than the hydrocarbon being distilled through the tubes to mechanically remove vaporized constituents of the oil.

No. 1,559,981, granted November 3 to Earl Petty, Winfield, Kansas, assignor to the DeLaval Separator Company, New York, for a process of treating paraffin base crude mineral oil to obtain wax mainly in amorphous form and wax mainly in crystalline form, which comprises subjecting oil containing said waxes to refrigeration and centrifugal separation to separate wax from the oil and subsequently distilling the wax to drive off a crystalline wax distillate, leaving as a residue wax mainly in the amorphous form.

No. 1,559,982, granted November 3 to Earl Petty, Winfield, Kansas, assignor to the DeLaval Separator Company, New York, for a process of treating paraffin base crude mineral oil to obtain therefrom a wax-free low pour bright stock, which comprises subjecting the oil, without distilling off wax distillate, to refrigeration and centrifugal separation to separate wax from the oil, distilling the wax-free oil to obtain therefrom distillates of different boiling points, diluting the residue with a low boiling point petroleum, distillate, subjecting the thus formed blended stock to successive treatments with an acid and an alkali, and distilling off the diluting distillate.

No. 1,560,137, granted November 3 to Harold B. Bernard, Tulsa, Okla., assignor to Sinclair Oil and Gas Company, Tulsa, for a process of separating absorbed gasoline from liquid absorbing mediums, which comprises subjecting the gasoline charged medium to a distillation treatment by the application of heat and passing the heated liquid residuum from the distillation treatment in countercurrent flow and in indirect contact with the distilled vapors and gases under a pressure lower than that prevailing in the distillation treatment.

No. 1,560,138, granted November 3 to Harold B. Bernard, Tulsa, Okla., assignor to Sinclair Oil and Gas Company, Tulsa, for a process of recovering gasoline from natural gas, casinghead gas and the like, which comprises subjecting the gas to an absorption treatment with a liquid absorbing medium, subjecting the charged medium from the absorption treatment to a preliminary distillation treatment by the application of heat, and passing the liquid free from distillation treatment while hot in counter current flow and indirect contact with the distilled vapors and gases from the distillation treatment.

No. 1,560,891, granted November 10 to William M. Bagwill, Long Beach, Calif, for a still for cracking oil, having in combination a shell forming a still body of substantially ovate cross section with flat sides and the apex at the bottom, and continuous combustion passages extending through the body lengthwise from end to end and the uppermost passage of the largest diameter, the other passages progressively diminishing in diameter, said passages being mounted in the still so that the oil between the passage and the lateral walls of the still is substantially the same thickness for each successive passage.

No. 1,561,044, granted November 10

A *Mercury* Actuated Temperature Controller

For years manufacturers have striven to produce a temperature controller that could be operated by MERCURY. For it is an acknowledged fact that mercury is the most sensitive, the most accurate and the most durable, when it comes to measuring temperature. That's why nothing has ever replaced mercury for the clinical thermometers upon which human life often depends.

Now we have found a way to operate the time tested, rugged Honeco Controller by mercury.

Honeco

is the only controller operated by mercury.

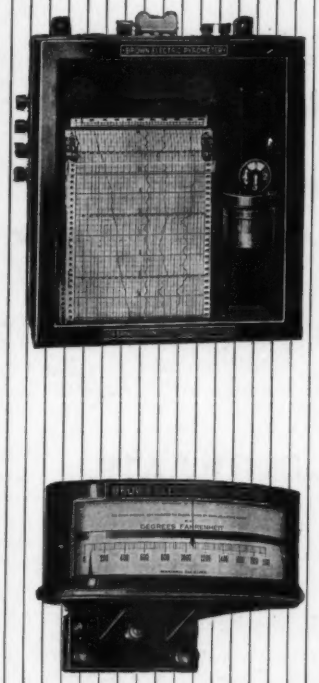
It makes possible the temperature control of numerous processes in refineries that it has been impossible to handle satisfactorily with gas or vapor tension controllers—especially processes where the bulb is periodically subjected to a temperature considerably in excess of the operating point. No other controller will endure such conditions without injuring its life and accuracy.

The Honeco is adapted for controlling temperatures from minus 40 degrees to plus 900 degrees F., permitting the use of ONE controller for one or a dozen conditions. Furnished with short or long range for operation at any point within this range. Its sensitivity is the same at any point of the range.

Ask for Catalog No. 16-2500

AMERICAN SCHAEFFER & BUDENBERG CORP.
BROOKLYN, N. Y.

Boston, Buffalo, Chicago, Detroit, Cleveland, Los Angeles, Salt Lake City, Tulsa, Philadelphia, Pittsburgh, Seattle



The Only Pyrometers Made Which Can Have

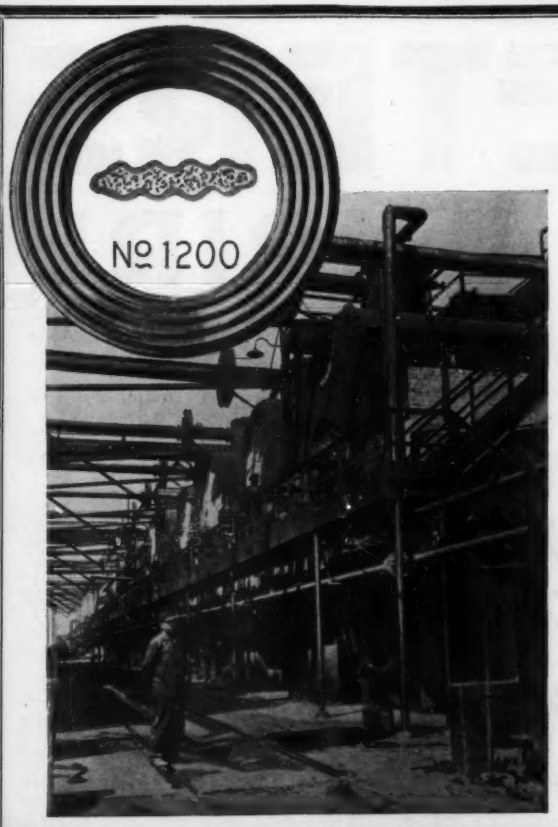
AUTOMATIC
COLD JUNCTION COMPENSATION
INCLUDING
TEMPERATURE COEFFICIENT AND
MEANS OF ZERO ADJUSTMENT

Patented December 28th, 1920

Write for Catalog No. 14 today

Address to The Brown Instrument Company, 4537 Wayne Avenue, Phildelphia, Pa., or to one of our District Offices, at New York, Boston, Pittsburgh, Cleveland, Chicago, Indianapolis, Birmingham, Houston, Tulsa, Los Angeles, San Francisco or Montreal.

Brown Pyrometers
Most used in the world



GOETZE
METAL ASBESTOS
GASKETS

Withstand oil at high temperature and high pressure. Goetze Gaskets give efficient service insuring against leakage and fire risks.

Goetze Gasket & Packing Co.

28 Allen Avenue
NEW BRUNSWICK, NEW JERSEY

LARGE PROFITS FROM

Tank Settlings and Debris Coke
Suspended in Fuel Oil Through

PREMIER COLLOID MILL

New Processed Fuel Yields
Over 18,000 B. T. U.'s per pound
Easily Burned in Oil Burners
This Process Permits

GREATER PRODUCTION OF PRESSURE DISTILLATE

—■—

EMULSIONS

ASPHALT * TAR * BITUMEN

Plants Designed and Operation directed by expert in the field.

PREMIER MILL CORPORATION
GENEVA, NEW YORK, U. S. A.

Basic U. S. Patent No. 1,523,632
Basic Canadian Patent No. 244,685

OIL METERS
THE EMPIRE

Invaluable for securing accurate records of separate runs, or of continuous flows. Practical and reliable for all refinery processes.

Oscillating Piston design—entirely different from every other type of meter offered for oil measuring service.

Unsurpassed in over forty years for LASTING accuracy, and ease and cheapness of upkeep.

All sizes from 5/8-inch to 6-inch
Standard and high pressure types

Send for fully illustrated EMPIRE circular, which gives full particulars of all styles and sizes. Ask for No. 110-R.

National Meter Company

299 Broadway, New York

Chicago Boston Cincinnati Atlanta San Francisco Los Angeles

Tell them where you saw the ad

to Clive M. Alexander, Tulsa, Okla., for an improved baffle for promoting gas and liquid contact, comprising a series of sheets or plates supported in spaced substantially parallel relation with a plurality of projections trapezoidal in configuration arranged in the spaces between the sheets or plates with shorter parallel trapezoidal faces of the projections disposed toward one face of the baffle, said projection being formed of flanges integral with the sheets or plates.

No. 1,561,066, granted November 10 to Frederick G. Farr, New York, for a hydraulic oil-delivering system, comprised of the combination with a storage tank of an oil conduit for filling and emptying said tank, water inlet and outlet connections, and mechanism for automatically controlling said inlet and outlet connections by the inflow or outflow through said oil conduit to permit the displacement of water by the oil and of the oil by the water, of means operated by an abnormal change in the water level for closing said oil inlet and outlet conduit.

No. 1,561,169, granted November 10 to Henry G. W. Kittredge, Toledo, Ohio, assignor to Carolina A. Kittredge, Toledo, for a still installation embodying a housing, a furnace, a first reservoir having an arched top for exposure to heating action from the furnace and a lower portion adapted to receive a precipitate in a portion thereof shielded by the housing from said furnace heating action, and a second fire tube reservoir mounted by the housing to receive the heating action from over the top of the first reservoir.

No. 1,561,260, granted November 10 to Ellis Mallery, Los Angeles, Calif., for an oil storage system comprising an oil storage reservoir, walls forming an enclosure, the greater portion of said enclosure being below ground water level; walls forming a well in open communication with the soil, said well having open communication with the lower part of said enclosure, and means for rapidly conveying water from said well.

No. 1,561,261, granted November 10 to Alfred George Marshall, Purley, Eng., for a process of manufacturing a lubricating compound which comprises heating and mixing together castor oil and a mineral oil until solution takes place, allowing the solution to cool until a separation into layers is complete, drawing off the lower layer and adding to the latter such further quantity of castor oil as will on cooling to 0° C. prevent a further separation taking place.

No. 1,561,758, granted November 17 to George W. Wallace, East St. Louis, Ill., for a still for cracking oil, comprising a plurality of banks of tubes adapted to contain oil that is to be cracked, transversely-disposed headers at the ends of said tubes communicating with the tubes of the respective banks, a passageway in which said tubes are arranged, means for causing products of combustion to circulate through said passageway longitudinally of said tubes, endless chains arranged in oppositely-disposed tubes of the respective banks, sheaves or the like in said headers around which said chains travel, means for actuating said chains so as to remove carbon that collects on the interior of said tubes, a carbon collection chamber at the bottom side of one header, an outlet from said chamber, and means operable from the exterior of said chamber for discharging the carbon that collects in said chamber through said outlet.

No. 1,561,779, granted November 17 to Gustav Egloff, Chicago, assignor to Universal Oil Products Company, Chicago, for a process of cracking oil consisting in passing the oil through a heating coil wherein it is subjected to cracking conditions of heat and pressure, in transferring a portion of the oil from said coil into a primary expansion chamber, in directing all of the oil constituents from said primary expansion chamber to a secondary chamber, and in introducing the remaining portion of the heated oil from said coil directly into the liquid oil in said secondary expansion chamber to increase the conversion therein.

No. 1,561,899, granted November 17 to Emile Augustin Barbet, Paris, France, for a process for extracting benzols from heavy oils comprising progressively heating a mixture including a heavy nonvolatile oil containing absorbed materials normally present as vapors in coke oven gas, first by the heat of the outgoing stripped oil and by the vapors carrying naphthalene coming from the high heating of such oil as set forth below, thereafter running the somewhat preheated oil through a column still including a rectifying column and first heating the same by indirect steam heat to about 160 degrees C., while drawing off the evolved vapors of the lower part of the rectifying column through which such vapors rise, further heating the unvolatilized oils by blowing thereinto superheated steam capable of raising the temperature of such oils to vaporize the naphthalene, and drawing off the mixed vapors containing naphthalene and superheated steam and cooling such vapors by indirect cooling with lukewarm incoming oils, such vapors being kept separate from those passed through the rectifying column.

No. 1,561,999, granted November 17 to Paul W. Prutzman, Los Angeles, assignor to General Petroleum Corporation, Los Angeles, for a method of purifying and partly decolorizing oil, which consists in mixing with a portion of the oil to be decolorized a powdered porous adsorbent material, allowing the mixture to rest until the air has been displaced from the pores of the adsorbent by the oil intermixed therewith, then heating the remainder of the oil to a temperature above 350 degrees F. and intermixing therewith the above said mixture of oil and adsorbent, to permit the adsorbent to withdraw coloring matter from the oil, and finally separating the spent adsorbent with its contained coloring matter from the decolorized oil by mechanical means.

No. 1,562,000, granted November 17 to Paul W. Prutzman and Paul D. Barton, Los Angeles, assignors to General Petroleum Corporation, Los Angeles, for a method of removing acid-tar from acid-treated petroleum oil containing tar, which consists in the agitation with such oil of a powdered adsorbent, which adsorbent has previously expended its adsorptive value in removing impurities from tar-free oil and is charged with said tar-free oil.

No. 1,562,001, granted November 17 to Paul W. Prutzman and Carl J. von Bibra, Los Angeles, assignors to General Petroleum Corp., Los Angeles, for a method of decolorizing oil which consists in preparing a mass of pulverulent solid decolorizing material in the form

Refiners to Meet in Fort Worth

Tulsa, Okla.—Fort Worth has been selected as the meeting place for the 1926 convention of the Western Petroleum Refiners Association. The dates are March 2, 3 and 4. All sessions will be held in the Texas Hotel.

A recent bulletin of the association has this to say regarding arrangements:

"No committees have as yet been appointed, hence, no definite announcements can be made at the present time. It is the intention, however, that the speaking program include several of the outstanding characters of the industry and that the meeting establish new records in interest, instruction and attendance."

Success of the technical features of the program of last year in Kansas City give every indication that similar efforts will be attempted this year. The Kansas City convention was the first of the association in which technical matters were taken up.

This part of the program resulted in technical men of the refining industry attending the session. A larger attendance was the result.

In selecting Fort Worth, the association has made it possible for both executives and engineers of the Texas, Louisiana, Oklahoma and Kansas plants to attend with ease. Fort Worth offers excellent rail connections for the several refining centers of the Mid-Continent area.

of an aqueous mud, whereby air is excluded from the pores of the decolorant, mixing such mud with the oil to be decolorized and heating the mixture until the water is driven out of the aqueous mud, whereby the solid decolorizing material is brought into intimate contact with the oil, and finally separating the spent solid decolorant from the decolorized oil.

No. 1,562,009, granted November 17 to Henry P. Straus, New York, for a fractionating apparatus consisting of a closed chamber, a plurality of spaced perforated plates therein dividing said chamber into a plurality of compartments, a layer of contact material on each of said plates and means for maintaining condensate at a substantial, predetermined height above the plates.

No. 1,562,156, granted November 17 to Jacob F. Faber, Los Angeles, and Henry C. Hanna and Marvin L. Chappell El Segundo, Calif., assignors to Standard Oil Company, San Francisco, for a process of refining petroleum oils, which consists in treating an oil with sulphuric acid, separating the treated oil from the acid sludge and neutralizing the treated oil in the presence of a petroleum carboxylic salt to prevent the formation of a persistent emulsion, said petroleum carboxylic salt being obtained by extraining petroleum carboxylic acids from crude petroleum oil by means of water solution of a metallic base, thus being free of sulphonated soaps.

No. 1,562,425, granted November 17 to Adolph Greenspan, Minatitlan, Vera Cruz, Mexico, for a process of removing crystalline and amorphous wax from oil which consists in first causing crystallization of the crystalline wax at a temperature of between 80 and 90 degrees Fahrenheit by the addition of 15 to 20 per cent of kerosene, then mechanically separating the oil from the wax crystals, and then distilling off amorphous wax and kerosene from the separated oil until the residuum in the still is a high grade cylinder stock.

No. 1,562,541, granted November 24 to Stephen H. Corfield, San Diego, California, for an oil shale retort comprising a casing having a closed top and bottom through which oil shale is passed; a plurality of spaced apart superimposed tables concentrically with said casing, a vertical support centrally in said casing and tables; a plurality of baffle plates secured on said support and spaced between said tables to direct currents of heat around said tables; a skeleton frame operable concentrically within said casing; a plurality of scrapers carried by and operated with said frame and spaced one above each of said tables, and having a portion of each scraper cut into blades, with the blade portions alternately staggered in relation to the uncut portions; with means to rotate said frame and scrapers to move shale from one table to the table below it through an opening cut in the floor of the table offset in position relative to the other openings.

No. 1,562,550, granted November 24 to Frank W. Hall, Port Arthur, Texas, assignor to the Texas Co.,New York, for a process of retreating spent absorbent material used in refining mineral oils that comprises subjecting the material to the distilling action of a carrier gas and then heating the material in the presence of air.

No. 1,562,690, granted November 24 Max F. deBajligethy, Houston, Tex., for a still enclosing an oiler, a plurality of reacting drums mounted therein and one end of which projects outside of the boiler, a detachable head carried by the outer ends of said drums, and inlet pipe formed with heating coils entering one end of the drum and a discharge nozzle leading from the outer end of the drum and entering the boiler.

No. 1,562,712, granted November 24 to Wynn Meredith, Alameda, Calif., assignor to Petroleum Rectifying Co., San Francisco, for a method of separating conducting particles from an insulating media which comprises imparting an electric charge to other particles; introducing said charged particles into said media, and subjecting said media and said charged particles to an electric stress.

No. 1,562,723, granted November 24 to Daniel Pyzel, Piedmont, Calif., as-

View of Wyatt's Test Floor

The reputation a manufacturer has with his trade is built upon character. If the reputation is good the character of the organization in its adminstration, its operatives and its physical equipment will be found to be of the best. The purpose and will to do good work may be inherent but without the facilities the results will be unsatisfactory.

The facilities for testing shown in the above cut are representative of the care and thought that have been given to the equipment of the entire shop for building up the excellent reputation which this company enjoys thruout the entire Southwest in every branch of the Oil Industry where plate work is used.

Wyatt Metal & Boiler Works

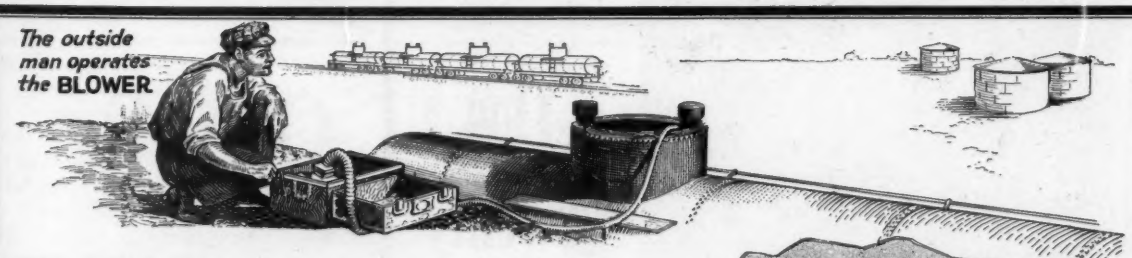
Dallas, Texas

We can supply your immediate requirements for Class IV Insulated Tank Cars. Write or wire us now for lease quotations on Conley Cars that give efficient S-E-R-V-I-C-E.

CONLEY TANK CAR COMPANY

OLIVER BUILDING
PITTSBURGH, Pa.

MAGNOLIA BUILDING
DALLAS, TEXAS



Feed him
FRESH-COOL-AIR

—and he'll work with greater ease, comfort and safety.

The M-S-A Standard
HOSE MASK

Supplies a continuous stream of fresh air to workers in Tank Cars, Oil Tanks, or in any confined gaseous space.

Send for Bulletin No. 99F for complete information on this and other types of Hose Masks

Mine Safety Appliances Co.
Braddock Ave & Thomas Blvd. Pittsburgh, Pa.

Standard for the American Gas Association

signor to Simplex Refining Co., San Francisco, for a process of refining liquid bituminous material which comprises mixing said material with solid matter to form a bituminous mixture, rolling said bituminous mixture in the form of coherent balls through a chamber, and passing hot non-oxidizing gases through said chamber in contact with said balls.

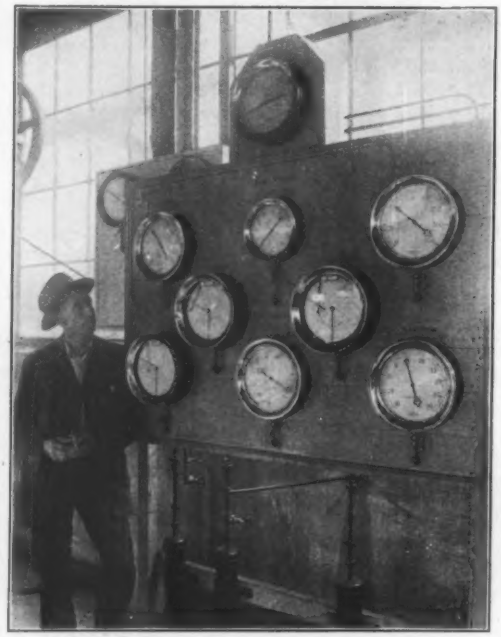
No. 1,562,868, granted November 24 to Marvin L. Chappel, Inglewood, Calif., assignor to Standard Oil Co., San Francisco, for a process of treating spent decolorizing and clarifying agents containing the basic ingredient hydrous magnesium silicate, which comprises contacting the silicate with a color solvent containing the requisite sulfuric acid to restore at least the original decoloring and clarifying powers of the silicate.

No. 1,563,012, granted November 24 to Benjamin T. Brooks, Bayside, N. Y., assignor by mesne assignments to Carbide & Carbon Chemicals Corp., New York, for a process of making motor spirit which comprises cracking a petroleum product under conditions given a material rich in olefins, subjecting this material to the action of a sulphuric acid equivalent to strong aqueous H_2SO_4 of Baume gravity materially less than 66 degrees, separating the oil from the substances immiscible therewith, treating the separated oil with an alkali, and distilling off and collecting the oil.

No. 1,563,099 granted November 24 to William Cullen Morris, Flushing, and George E. Woods, Astoria, N. Y., for a storing and delivering apparatus for oil, comprising an exterior tank closed at top, bottom and sides, a second secured on the bottom the exterior tank and within the same, the top of the inner tank being closed and its sides perforated adjacent the bottom, the top of the inner tank having a small central dome, a vent pipe leading to the atmosphere from said dome and passing through the top of the exterior tank, a second vent pipe in the top of the exterior tank, means for admitting water to the outer tank, and a single oil conduit entering substantially at the center of the bottom, terminating in said dome and adapted to selectively fill or drain the inner tank.

No. 1,563,199, granted November 24 to Harrison R. Leland, Parkersburg, W. Va., assignor to the Parkersburg Rig and Reel Co., Parkersburg, W. Va. for a pressure regulator for tanks comprising a casing, a partition wall arranged substantially centrally thereof and extending from the top of the casing to a point near the bottom to provide a pair of chambers communicating with each other at the bottom of the casing, each of said chambers being provided with openings arranged at the top thereof, one of said openings being connected to an inlet pipe and the other of said openings to an outlet pipe, a normally open valve arranged in said outlet pipe and means for closing said pipe.

No. 1,563,271, granted November 24 to Carl S. Fogh, Philadelphia, assignor to Ore Roasting Development Co., Philadelphia, for a process of recovering oil from shale and oil sands consisting of heating such material during its passage through a practicallly gas-tight mechanically-rabbled furnace by contact with practically non-oxidizing gases heated to a temperature sufficient to vaporize the volatile constituents, removing the gasses carrying the volatile constituents from the furnace in continuous flow and condensing the condensible volatile constituents from the said gases, and reheating the said gases to a sufficient temperature to cause vaporization of the volatile constituents from the material passing through the furnace and such heated gasses into the furnace.



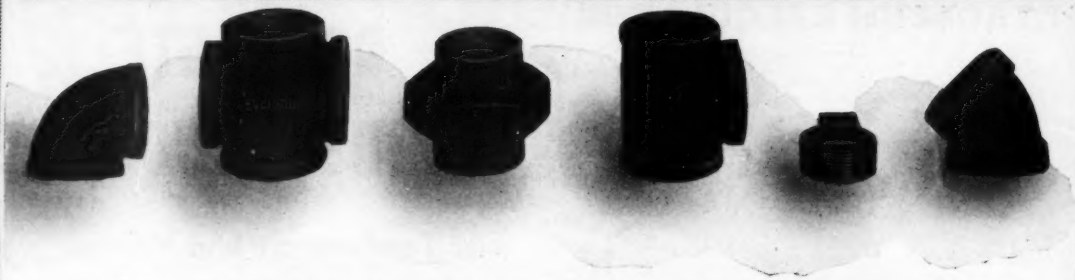
One of Twenty

A good example of the widespread use of Foxboro Instruments in the oil and natural gas fields of the country is the Foxboro Gauge Board shown above. It is but one of twenty compressor plant gauge boards used by the Shell Company of California at Long Beach.

Here on this Gauge Board is centralized all the information of plant operation. These Foxboro instruments are even more dependable than the human brain. They do not fatigue. They are sensitive to the slightest variation of vacuum or pressure every minute of the day and night, and this accuracy is maintained for the life of the instruments. Write for complete information.

THE FOXBORO CO., INC.
Neponset Avenue, Foxboro, Mass., U. S. A.
295 South Cheyenne Avenue, Tulsa, Okla.
New York Chicago Boston Philadelphia Pittsburgh Cleveland Rochester
Atlanta Los Angeles San Francisco Portland, Ore.

FOXBORO
REG. U.S. PAT. OFF.
THE COMPASS OF INDUSTRY



CORROSION PROOF!

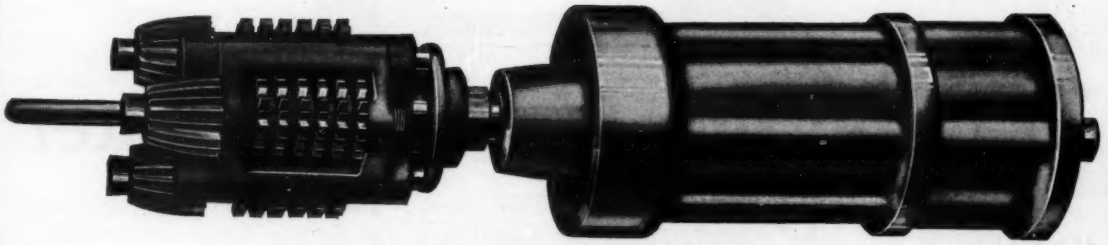
Sulphuric acid, caustic soda and other materials are readily handled with

SCHUTTE KOERTING EVERDUR EQUIPMENT

Send for new Bulletin 7-E describing the Valves, Fittings and Jets made of Everdur

SCHUTTE & KOERTING CO., 1253 N. 12th Street PHILADELPHIA, PA.

ROTO TUBE CLEANERS



Roto Air-Driven Heavy Duty Cleaner

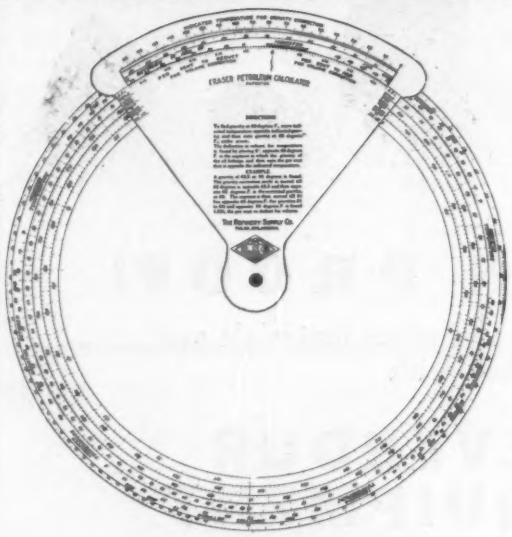
For

CRACKING STILLS

The Roto Company

HARTFORD, CONN.

FRASER
PETROLEUM CALCULATOR



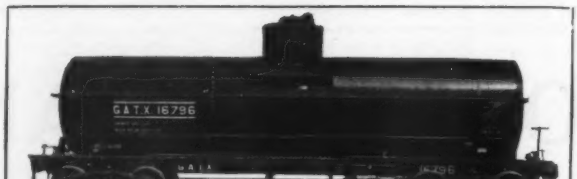
PATENTED

COMPLETE
RAPID—ACCURATE

Temperature and Volume
Corrections
by
two moves of the Indicator Arm
According to
A. P. I. Tables

THE REFINERY SUPPLY CO.

Largest Scientific Material House in the Southwest.
TULSA, OKLAHOMA



Transporting Liquids in Winter

DURING winter months the problems of handling liquids multiply. Transportation slows down and more cars are needed to facilitate deliveries.

Commodities such as crude oil, vegetable oils, syrups, molasses, asphalt, etc., are protected in G A T X Tank Cars equipped with steam heat coils.

Superior design and workmanship plus painstaking construction insure safe, speedy transportation wherever G A T X Tank Cars are used.

The peak season of demand for this type of car is rapidly approaching.

Make arrangements *now* to cover your requirements before a shortage overtakes you.

BRANCH OFFICES

Eastern Office:
17 Battery Place
NEW YORK CITY

Mid-Continent Office:
502 Cosden Building
TULSA, OKLA.

Pacific Coast Offices:
Rialto Building
SANFRANCISCO, CALIF.

Bartlett Building
LOS ANGELES, CALIF.

Southern Office:
Union Indemnity Building
NEW ORLEANS, LA.

GENERAL AMERICAN TANK CAR CORPORATION

General Offices: **Illinois Merchants Bank Building, Chicago, Ill.**

PLANTS: East Chicago, Ind.; Fort Worth, Texas; Warren, Ohio; Sand Springs, Okla.; Good Hope, La.; Wichita Falls, Texas

Tell them where you saw the ad

REFINERY AND GASOLINE PLANT ACTIVITIES

Constitution Amendments Provide Two Committees

Tulsa, Okla.—Following ratification of a change in the constitution, the Association of Natural Gasoline Manufacturers is now functioning with the aid of an executive committee. By this same change the body formerly known as the executive committee is now the board of directors.

Members of the executive committee are selected from the board of directors, this being the present committee: E. L. Peck of the Empire Gasoline Company and president of the association; D. E. Buchanan, Chestnut & Smith Corporation; A. M. Ballard, Sun Company; Emby Kaye, Skelly Oil Company; F. E. Rice, Phillips Petroleum Company; A. J. Schlosser, Barnsdall Oil Company; Lloye F. Bayer, Tidal Oil Company.

The change in the constitution makes article three read as follows:

"There shall be a board of directors, consisting of twenty-three members, of which the president and vice presidents shall be ex-officio members.

"The board of directors at their annual meeting shall elect an executive committee, composed of seven members from nominations made by the president, of which the president shall be chairman. Any member of the board of directors shall be eligible to serve on the executive committee. This committee will facilitate the duties of the board of directors and its acts shall be subject to approval of the board of directors.

"The secretary-treasurer shall be elected by the board of directors at their first meeting following the annual convention."

Another committee added through a change in the constitution is one on finance and budget. Its members are A. M. Ballard, chairman; Emby Kaye, D. E. Buchanan, Lloyd F. Bayer and H. R. Johnson, E. L. Peck, president, and with A. V. Bourque, secretary-treasurer, an ex-officio member.

Duties of this committee are outlined in article fifteen of the constitution as follows:

"Promptly following each annual convention, the president of the association shall appoint a finance and budget committee, composed of five members of the executive committee, the president and secretary-treasurer to be ex-officio members of this committee.

"This committee will hold two regular meetings each year on the first Tuesday in May and on the first Tuesday in October. Other meetings during the year may be called at the request of the secretary-treasurer or other members of the committee."

Building Newton Plant

Cushing, Okla.—The Cushing Refining and Gasoline Company is to build a Newton process absorption natural gasoline plant two miles south of Ripley. The plant will handle gas from properties of the Mul-Berry Oil Company in the Meehan field, as well as from other leases south of Ripley.

Contract has been made with Hurley Bros. of Tulsa for the construction. The site has been acquired and work will begin shortly.

New Cracking Units to Be Put In at Texas City

East Chicago, Indiana.—The Terminal Oil and Refining Company, Houston, Texas, has contracted with Graver Corporation, East Chicago, Indiana, for one 1000 barrel per day Standard Unit Jenkins Cracking Process to be installed at their Texas City, Texas, refinery.

Construction and design will be made for temperature and pressure suitable for cracking the Mid-Coastal oils.

Wilson-Snyder Gets Big Pump Order

Pittsburgh, Pennsylvania. — Wilson-Snyder Manufacturing Company, Pittsburgh, has been awarded a contract for constructing 24 pipe line pumping engines. These engines will be installed in eight pumping stations which the Crusader Pipe Line Company, of Arkansas will build in connection with their new pipe line now being laid from the Smackover field, to the Mississippi River, near Monroe, Louisiana, a distance of approximately 150 miles.

Electricity for Pumping

Arkansas City, Kansas.—The Kanotex Refining Company has adopted electric motors for water pumping. Power will be bought from the Kansas Gas and Electric Company.

The Kanotex is just completing additions and improvements, including cracking units. Runs are now around 5000 barrels daily.

Plant Operators' Meetings Into Texas

Tulsa, Oklahoma.—Meetings of natural gasoline plant operators will be carried into Texas. One meeting for the Central West Texas territory will be held under auspices of the Association of Natural Gasoline Manufacturers.

Following this, the further program for the year will be outlined. The date and place for this one meeting have not been determined. It will be held at either Breckenridge or Ranger. The date will depend on arrangements of the committee in Texas.

Further meetings call for sessions in Texas and in the Arkansas-Louisiana territory. The Burkburnett territory is one to be visited, while the gasoline plants around El Dorado, Arkansas, are the center of another possible meeting.

The Oklahoma meetings came to a pre-holiday end with a meeting December 4 at Okmulgee. Departing from the plan introduced for the season, only one meeting was held, and that at night.

In the other Oklahoma centers, programs were arranged for both afternoon and evening. This was done to allow the men of different shifts to take advantage of the programs, which included talks on plant operating methods, with discussions by those attending.

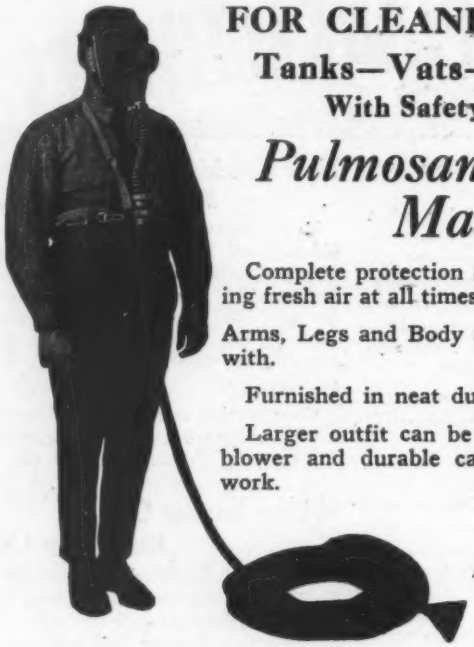
But the first meetings failed to arouse sufficient interest for the afternoon sessions, which were not as well attended as the night sessions.

The first series of meetings also came on three successive days, in three towns of a district. This required speakers to be away from company duties over this period.

So the one-night meeting was adopted for Okmulgee. This is to be carried out for the West Texas session. The success of this meeting will determine what is to be done about further sessions for the Burkburnett territory, as well as the Arkansas-Louisiana area.

The first group of Oklahoma meetings called for sessions afternoon and evenings at Tonkawa, Garber and Burbank, November 3, 4 and 5 being the dates. Next came Drumright, Depew and Sapulpa, November 17, 18 and 19.

Other territory to be considered is that around Ardmore, which likely will be combined with the meeting for Burkburnett.



FOR CLEANING INSIDE
Tanks—Vats—Tank Cars
With Safety Use the
Pulmosan Airline Mask

Complete protection for the operator, using fresh air at all times.

Arms, Legs and Body always free to work with.

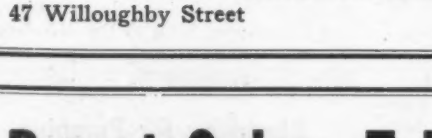
Furnished in neat durable carrying case.

Larger outfit can be supplied with light blower and durable case for extra heavy work.

Prices and Literature on Application

Pulmosan Safety Equipment Co.
MANUFACTURERS
47 Willoughby Street Brooklyn, N. Y.

Repeat Orders Tell the Story
***For* Metallo**
"Refinery Type"
Gaskets



WHEN LARGE CORPORATIONS constantly re-order a certain type of gasket for their refinery service, it is a sure bet that the gasket is giving A-1 satisfaction.

THAT IS EXACTLY WHAT the biggest oil refiners in the country are doing on Metallo "REFINERY TYPE" Gaskets. These gaskets are in steady use day after day on all types of joints, no matter what the cracking process is.

900 LBS. PRESSURE—1112 DEG. F.
are usual working conditions for Metallo "Refinery Type" gaskets. They stand up so well under this service because they are made of asbestos encased all around in corrugated special steel, our Style 1000 Metal.

Metallo "Refinery Type" Gaskets are also made in monel or other metal, and in any size to suit particular requirements. Sample section, showing construction, will be sent upon request.

Metallo Gasket Co.
New Brunswick, N. J.

Bureau Studies Methods of Wax and Lube Making

AN intensive study of methods of manufacture of paraffin wax and lubricating oils is being conducted by the Bureau of Mines, Department of Commerce. Lubricating oils is one of the most important and essential products of petroleum, as evidenced by a widespread use of petroleum lubricants in factories, machine shops, and powerhouses, and particularly in motor cars and motor trucks, the Bureau points out. The total production of lubricating oil in the United States during 1924, 1,154,000,000 gallons, shows how widespread is the use of this commodity.

Lubricating oil of high quality can be made from almost any crude petroleum but because of differences in their chemical nature it is very much easier to make lubricating oils from some crudes than from others. To find out in detail why this is so is the object of the Bureau's present investigation.

At lease 75 per cent of the lubricating oil manufactured in the United States is made from crude oil that contains paraffin wax (so-called "paraffin base" or "intermediate base" crude.) This wax has a boiling range similar to that of the lubricants found in the crude, consequently the lubricating distillates obtained from these crudes contain wax that must be removed before satisfactory lubricants can be produced.

Separation of wax from oil is often a very difficult and expensive process; in fact, many progressive refiners consider wax a necessary evil. The price received for finished paraffin wax is frequently less than the total cost of recovering and refining it. However, the expense of separating crude wax from the lubricating oil is a large part of the total cost, so that the actual refining of wax is usually profitable.

Methods of Measuring

Before the problem of separation of oil and wax could be investigated it was found necessary to study in detail methods for measuring the concentration of paraffin wax in oil-wax mixtures and to devise new methods which would be more satisfactory for research than any in present use. In Technical Paper 368, by L. D. Wyant and L. G. Marsh, the results of work that has been done along this line, under a cooperative agreement between the Bureau of Mines and the State of Oklahoma, are given. The present methods of testing oil-wax mixtures and commercial paraffin waxes are compared and a new method that depends upon the relative insolubility of paraffin wax in acetone is described.

The American Society for Testing Materials' paraffin-wax melting-point method has been found an accurate and satisfactory method of determining the melting point of commercial paraffin-wax or wax-oil mixtures of relatively low oil content;

however, the method is unsatisfactory when the oil content is as much as 20 per cent.

The most satisfactory method of determining the melting point of oil-wax mixtures, in which the oil content is 15 per cent or more, is the American Society for Testing Materials' petroleum melting-point method.

The various experiments made in developing the use of acetone as a selective solvent for oil-wax mixtures showed the following interesting facts:

The difference in solubility of commercial grade oil-free paraffin wax in acetone between 50 degrees and 70 degrees F. is only 0.3 per cent. For high-melting-point oil-free paraffin it is only 0.13 per cent, thus making any one temperature between these limits satisfactory for comparative testing. The quality or melting point of the paraffin affects the solubility more than does an increase of temperature between 50 and 70 degrees F.

The amount of oil soluble in acetone at 60 degrees F. is from 5 to 15 per cent, depending upon the nature of the oil. This solubility decreases until it is only 2 to 10 per cent when the temperature is reduced to 50 degrees F., making 60 degrees F. a more suitable working temperature for separation of oil-wax mixtures than lower temperatures.

If the wax portion of a sample is crystallized out of acetone a second time, it is more nearly free of oil than any ordinary commercial paraffin wax. The matter of obtaining a truly representative sample of an oil-wax mixture is very important.

In testing oil-wax mixtures for their wax content, the wax portion has to be crystallized out of acetone a second time if its melting point is abnormally low. If the melting point of the wax portion is abnormally high the best procedure is to recover an additional crop of wax crystals from the oil portion of the separated sample by crystallizing it out of acetone a second time.

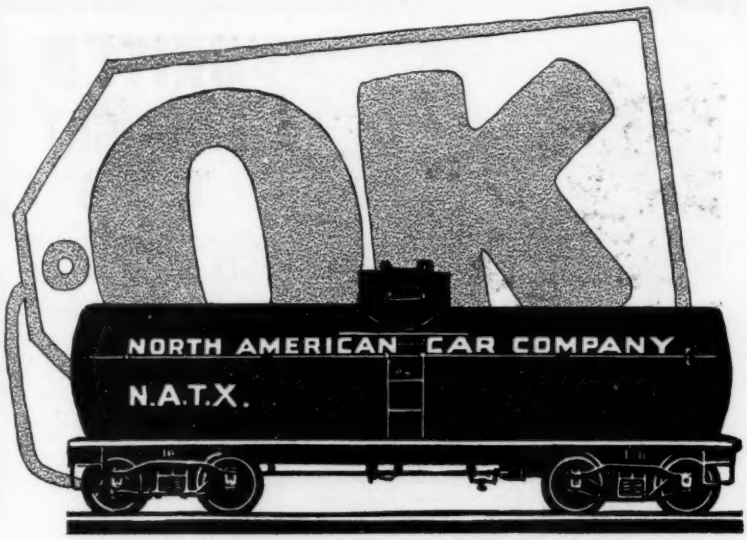
The accuracy of the above method of analysis increases as the percentage of wax contained in the sample or the melting point of the wax increases.

Technical Paper 368, "Paraffin wax and its properties; methods of testing wax and of analyzing oil-wax mixtures," may be obtained from the Bureau of Mines, Department of Commerce, Washington, D. C.

Power Equipment Bulletins

The Marion Machine Foundry and Supply Company, Marion, Indiana, have announced two bulletins of interest to the refining industry: No. 225 describing the company's new Heavy Duty Mechanical Stoker, individually driven by steam, air, or water, and a bulletin on Marion Soot Blowers, types E and EB. These blowers are especially recommended for use in water tube boilers.

Copies of both bulletins will be supplied on request.



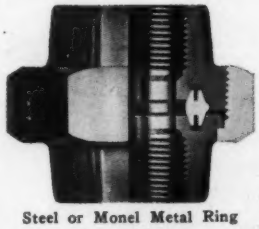
Endorsed by Shippers Large and Small

Seventeen years ago North American started business with 25 tank cars.
Today that number has grown to MORE THAN 2000.
The reason lies in the ever-increasing number of shippers who are stamping their O. K. on North American Car Leasing Service.
This service includes a fleet of modern cars, all in first class condition, of the type and capacity you want; the facilities of four completely equipped car repair shops, as well as extensive track and bulk storage at Chicago, Tulsa and New Orleans—where oils may be stored on warehouse receipts pending market changes, inspection, re-consignment or local distribution.
May we send you further details on this popular service?

At New Orleans we have established bulk and track storage of special benefit to EXPORTERS.

NORTH AMERICAN CAR COMPANY, 327 S. La Salle St., Chicago
Petroleum Bldg., Tulsa, Oklahoma

North American
CAR LEASING SERVICE
CHICAGO TULSA NEW ORLEANS



Steel or Monel Metal Ring Box Unions

We STOCK In Houston
Edward Forged Steel Valves
Framanco Forged Steel Fittings
Tycos Instruments
P. S. & I. Co.'s Forged Steel Pipe Flanges
ALSO SALES AGENT
Halyburton Gate Valves

Maintenance Engineering Corporation
1802 Conti Street Preston 5580
W. J. Peddie, Pres., Houston, Texas

'UNITED' GAS-TIGHT TANKS

—An Assurance of Long Service!

There is no secret as to the lasting quality of "United" Gas-Tight Tanks. They last longer because they are

—designed right
—fabricated right
—erected right

And, they are heavy plate, tight riveted, tight caulked—and guaranteed gas-tight.

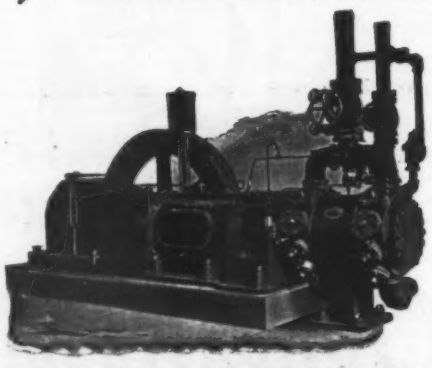
Let us quote you on your requirements. Estimates promptly furnished without obligation.

UNITED IRON WORKS, Inc.

TULSA LOS ANGELES KANSAS CITY DALLAS

Vilter **Ammonia Compressors Fittings and Pipe Coils**

Render Years of Reliable Service



Compressors built in several types and a great variety of sizes. Illustration is of a high speed type compressor.

Complete Data on Request

THE VILTER MFG. CO.
Established 1867
1152-1162 Clinton St. Milwaukee, Wis.

BRANCH OFFICE
413 Com'l Bank Bldg.
Houston, Texas

TAGLIABUE MFG CO N.Y.

Oil Testing Instruments In New Orleans

The complete Tagliabue line of Scientific Instruments is carried by us right here in New Orleans. The prices are the same as the factories. You save the difference in transportation charges and time.

Send for complete Catalog—Free.

WOODWARD, WIGHT & COMPANY, LTD.

The Largest General Supply House South Since 1867

NEW ORLEANS, LA.

The Future of Gasoline

(Continued from page 16)

tached to the production and transportation of coal, it is safe to say that oil as a fuel will in a few years appear as a threatening rival to the coal industry.

In the ultimate analysis the refiner finds himself being closed in on every side by ever-increasing and fluctuating demands for his various products. He cannot make one at the expense of the other without defying the simple economic law of supply and demand.

To recapitulate then, it seems desirable in planning for the future to reserve the "light stuff" for consumption in airplane engines. Kerosene and a certain quantity of cracked products may be blended for automobile use.

The latter suggestion has already been realized to some extent at least in overcoming certain disadvantages of cracked products and heavier distillates by blending with casing head gasoline and a large variety of other products. This practice when skillfully carried out is highly commendable.

It is possible that improvements in engine and carburetor design may provide more than adequately for the possibility of further and more satisfactory use of heavier oils, such as kerosene, for propulsion. The solution of this vexing problem should undoubtedly be the object of much experimental and research work.

Supply Has a Limit

Modern business ethics maintains that success goes hand in hand with philanthropy. And for selfish reasons only the refiner may do well to be philanthropic.

As things stand today the refiner is engaged in a feverish attempt to meet an ever-insistent and ever-increasing demand for gasoline and motor oils. But in so doing we are also drawing on the exhaustible and irreplaceable resources of nature. Granted that the report of the committee of eleven will prove to be an accurate forecast, are we fair to posterity? Can we satisfy our conscience when we make liberal use of resources without making a reasonable effort to provide for the time, however remote, when the last barrel of oil will be drawn and distilled?

Admirable research projects are being carried out for the perfecting of processes whereby we can obtain the large quantities of oil locked in porous strata. The utilization of shale for oil production is being investigated thoroughly and will no doubt lead to valuable developments in the near future. The production of benzol and other fuel products by the distillation of coals, lignites, asphalt and peat yield materials for blending purposes only, the available quantities in all cases not

being adequate to meet any great part of the automobile fuel demand.

Granted that these several sources might lead to some relief in the problem confronting the refiner, there is one factor yet to be considered. In selling gasoline the refiner is selling energy, and this energy is in the ultimate analysis, the refiner's stock-in-trade. As a good business man the refiner must look into the future and see that a sufficient stock will be available as long as his company will function.

In selling gasoline to the jobber and directly to the consumer the refiner is supplying a source of energy which has accumulated in the earth over a space of many thousands of years. There is no doubt that this source will never be replaced, at least for the use of the inhabitants of the earth for thousands of years to come. The day is coming, sooner or later, whether in a few years or a few hundred years when this store of energy will be exhausted. If the refiner is sore put to it now, what will he do then?

Although new oil fields are being continually developed in this country as well as in Mexico, South America, and elsewhere, nevertheless the time has come when sources of motor fuel other than petroleum must be given serious consideration, active research and commercial exploitation.

Since energy supply constitutes the difficulty in question, it seems that research work for the substitution in part of other sources of energy should be directed along lines which will lead not only to the more efficient use of irreplaceable energy which can be kept indefinitely where it is, but also to the supplementary utilization of available products which will form satisfactory blends with gasoline.

What of Alcohol?

This suggestion among other things apparently entails the development of alcohol as a motor fuel.

Alcohol is a bugaboo among oil refiners. And probably not without reason. The refiner asserts that he is engaged in the production of gasoline from crude petroleum, and not in an entirely different field—the production of alcohol from vegetation.

The energy which refiners sell in gasoline has been accumulated in the bowels of the earth through aeons of time as a result of vegetable decomposition. Alcohol is derived from the same source, but the supplies of raw material are being continually renewed and are susceptible to almost limitless expansion in a satisfactorily short time without threatening encroachment on the food supplies of the world.

Refiners in general shy at the suggestion of alcohol development. But the work is theirs. The benefits ultimately to be gained will be theirs, unless they allow themselves to be

FULTON DUPLEX
SENSITIVE VACUUM REGULATOR

On a system discharging gases to a line, under light vacuum, it is sometimes desirable to maintain atmospheric pressure.

For this purpose, we manufacture the DUPLEX VACUUM REGULATOR, which acts as a safeguard when used on the vapor lines connected to storage tanks, for the recovery of the gases, the purpose being to prevent the pulling of a vacuum.

WRITE US FOR FURTHER INFORMATION

CHAPLIN-FULTON MFG. CO.
28-36 Penn Ave., Pittsburgh, Pa.

New-136 pages 1926 edition

Do You KNOW Packing?

Special Chapters on Oil Service, Producing, Pumping, Refining, Centrifugal Pump Packing, High Temperature Service, Stuffing Box Proportions.

The most complete, reliable text book on packing ever published. Much new data never before printed. Send the coupon for your copy.

Complimentary

CRANE PACKING COMPANY
1808 Cuyler Ave., Chicago
109 Broad St. New York

Kindly send me your 1926 edition of "Metallic Packing".

Name.....
Company.....
Address.....
Title.....

PIONEER
TANK & BOILER Co.
TULSA-OKLA

Oil Refinery Tankage
CRUDE and STEAM STILLS
CONDENSER BOXES
AGITATORS, TOWERS
HEAT EXCHANGERS
SEPARATORS
STORAGE and PRESSURE TANKS
ETC.

Steel Warehouse Dept.
STEEL PLATES, SHEETS
ANGLES, BARS, BEAMS
CHANNELS, RIVETS
BOILER TUBES
FLOOR PLATES
TANK FLANGES
STAY BOLTS
SMITH COAL and COKE

Immediate Shipments from Tulsa Stock
PHONE O-1146 OR WRITE BOX 1926.

Electrically Driven Centrifuges
Hand Centrifuges
WRITE
WILLIAMS, BROWN & EARLE, Inc.
Manufacturers of Laboratory Apparatus
918 Chestnut St. Philadelphia, Pa.

Mettler Entrained Combustion Gas Burners
— FOR ALL —
Purposes, Kinds of Gas, Pressures
LEE B. METTLER CO.
406 S. Main St. Los Angeles, Cal.

A SIMPLE, DURABLE COVER
for a year's copies of
THE REFINER

If you are one of our readers who save consecutive issues of The REFINER AND NATURAL GASOLINE MANUFACTURER, you will want the convenience of this attractive Barrett Multiple Magazine Binder.
You can insert each issue as it is received, in just a moment's time, without disturbing any other issue. Keeps your copies neat, clean and intact. Price Postpaid, $2.75.
Send check to
The Gulf Publishing Company
P. O. Box 1307
HOUSTON, TEXAS

backed to the wall by others. Refiners should encourage research work and when possible actually partake in it, with the object in view of developing a means whereby alcohol and other non-petroleum products can be used to some extent at least in the production of motor fuels.

With the ever-increasing demand for gasoline, from now on every corner of the earth will be remotely searched for every trace of petroleum for the manufacturer of fuel. As the demand increases prices will rise and some genius may revolutionize the motor fuel industry by adapting alcohol or some other commodity for universal use. The refiner must anticipate such a development if for nothing else but selfish motives.

Possible Blends

By itself alcohol is not well adapted for use in present types of internal combustion engines. Its rate of burning is relatively slow. Yet the blending of alcohol with other fuels has recently led to some rather remarkable results. Further researches in adapting the engine to the fuel are progressing consistently.

Alcohol is a cleaner fuel than gasoline. Its use is marked by the absence of smoke and disagreeable odors in the exhaust gases. The hazards involved in its storage and handling are less than in the case of gasoline. The burning fuel can be extinguished by water.

The problem involved in the utilization of alcohol in a motor as a fuel is unique. The difficulties are great but not insurmountable. The greatest obstacle to be encountered is probably the difference in price, which will probably not long prevail.

By way of experiment the author has tried several alcohol blends in his own automobile with varying degrees of success. Alcohol-benzol-gasoline blends in varying proportions have been noted to give exceptional results with many decided advantages. The use of acetylene as a detonator is being investigated.

It is interesting to note that hydrocarbons obtained by the cracking process mix with alcohol to form low-boiling blends giving excellent results when used in a gasoline engine. Such phenomena as these are well worth studying.

If the refiner is to insure his future welfare and prosperity he would take steps to anticipate a rise in the price of gasoline by perfecting blends which will cut the ever-increasing excessive demands on "straight" distillate. If the refiner fails to foster such research the time may come when other interests will have developed non-petroleum fuels to such an extent that gasoline will no longer reign supreme in the motor fuel market.

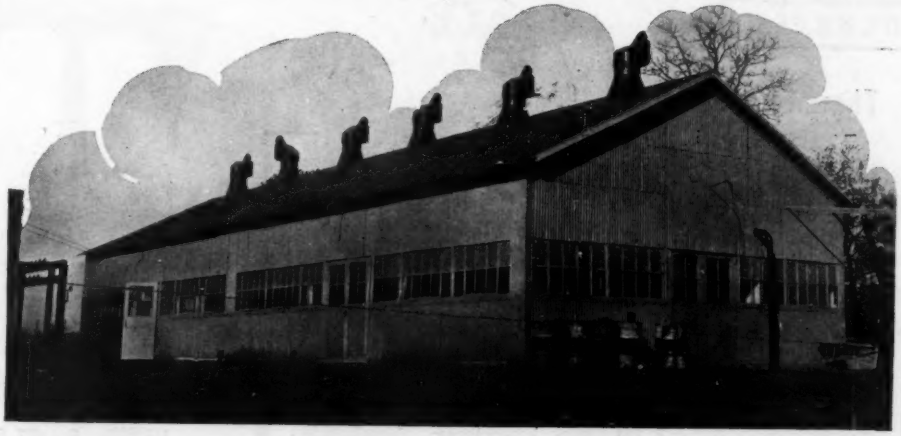
"UNDER FIRE"

Walsh Refractories stand up longest "under fire"—and over and around it, too.

The right refractory for your use

Without obligation, interested executives may obtain a helpful book free for the asking. 32 pages of useful, concise information

WALSH FIRE CLAY PRODUCTS COMPANY
NEW YORK · ST. LOUIS · CHICAGO



GASOLINE PLANT BUILDINGS

DESIGNED—FABRICATED—ERECTED
Our shops are well equipped to promptly fabricate your requirements

MOSHER STEEL AND MACHINERY COMPANY
DALLAS, TEXAS

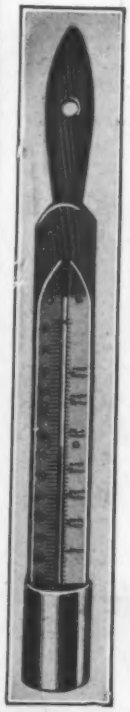
HOUSTON STRUCTURAL STEEL COMPANY
HOUSTON, TEXAS

Tell them where you saw the ad.

Index to Advertisers

Akin Gasoline Company ..... *
Geo. B. Allan and Co. ..... *
American Car & Foundry Company 47
American Cast Iron Pipe Company 43
American Schaeffer & Budenberg Corporation 50
Bessemer Gas Engine Company ..... Inside back cover
Blaw-Knox Company ..... *
C. F. Braun & Company 34-35
Brown Instrument Company 51
Burrell Technical Supply Company 66
Carbide & Chemical Corporation ..... *
Celite Products Company 37
Chestnut & Smith Corporation ..... Front cover
Chicago Bridge & Iron Works ..... *
Clark Brothers Company ..... *
C. & G. Cooper Company 12
Chaplin Fulton Manufacturing Company 63
Colloid Clay Chemical Products Co. 66
Conley Tank Car Company 55
Cook Paint & Varnish Company 35
Crane Packing Company 63
Curtin Mill Supply Company 66
Detroit Graphite Company 3
Eastern Steam Specialties ..... *
Emil Greiner Company 39
Foxboro Company, Inc. 56
Ft. Worth Laboratories ..... *
Garlock Packing Company 49
General American Tank Car Corporation 58
Goetze Gasket & Packing Company 51
Graver Corporation 33
Gray Processes ..... *
Greene Brothers ..... *
Griscom-Russell Company 9
Hills-McCanna Company ..... *
Hughes Tool Company 27
Kelly & Jones Company 45
Lagonda Manufacturing Company 39
Liberty Manufacturing Company 10
Lunkenheimer Company 5
Maintenance Engineering Corporation 61
W. N. Matthews Corporation 14
Mathieson Alkali Works, Inc. 4
McCord Radiator & Manufacturing Company ..... *
A. Y. McDonald Manufacturing Company ..... Back cover
G. and C. Merriam ..... *
Metallo Gasket Company 60
Lee B. Mettler Company 64
Midwest Piping & Supply Company 6
Mine Safety Appliances Company 55
Mosher Manufacturing Company 65
National Meter Company 52
National Petroleum Marketers Assn. ..... *
North American Car Company 61
Ohio Steel Foundry Company ..... *
Oil Conservation Engineering Company 11
Pennsylvania Forge Co. 7
Pioneer Tank & Boiler Company 64
Premier Mill Corporation 52
Pulmosan Safety Equipment Company 60
Quigley Furnace Specialties Company ..... *
Refinery Supply Company 58
P. H. & F. M. Roots Company ..... Inside front cover
Roto Company 57
Schutte & Koerting Company 57
Southwestern Engineering Company ..... *
Sun Company ..... *
C. J. Tagliabue Manufacturing Company ..... *
Taylor Instrument Companies ..... *
Terry Steam Turbine Company ..... *
Texas Fire Brick Manufacturers Assn. 29
Titusville Iron Works 41
United Iron Works 62
Universal Oil Products Company 8
Vilter Manufacturing Company 62
Henry Vogt Machine Company 31
Walsh Fire Clay Products Company 65
Wilson-Snyder ..... *
Western Machinery Company ..... *
Western Iron & Foundry Company 52
Williams, Brown & Earle, Inc. 64
Woodward, Wight & Company, Ltd. 62
Wyatt Metal & Boiler Works 54

BURRELL



Thermometers

The illustration shows our tank thermometer No. J-2660, range 30-220° F., wood back with handle and metal cup at bottom to retain liquid around bulb till temperature is taken.

Price **$1.75** Each

Our stock of thermometers includes all A. S. T. M. types, low temperature, pocket, armoured thermometers, etc.

All described in our catalog J.

Burrell Technical Supply Co.
PITTSBURGH, PENNA.

JABONITE
Si Al Al Si
Colloid Chemical Products
TRADE MARK

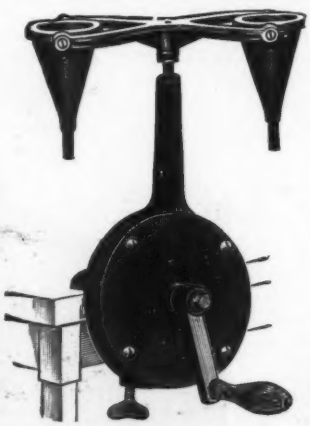
Jabonite Colloid Clay
Raw and Prepared

For Bleaching, desulpurizing and decolorizing Petroleum distillates and fractionations.

From four to twelve times as effective as Fullers Earth and other bleaching clays.

Correspondence solicited

Colloid Clay Chemical Products Co.
103 S. 18th Street
Omaha, Nebraska



"TAG"

OIL TESTING · INSTRUMENTS

A. S. T. M. Standard

STOCKED BY

CURTIN MILL SUPPLY CO.
HOUSTON, TEXAS

THE number of moving parts in Bessemer Engines is at an irreduceable minimum. Less parts mean less wear, less attention and less idle time for adjustment or repairs.

Simplicity and sturdiness go hand in hand with Bessemers. They deliver years of trouble-free service with practically no attention.

It pays to standardize on Bessemers—they cost you less during their many years of hard work.

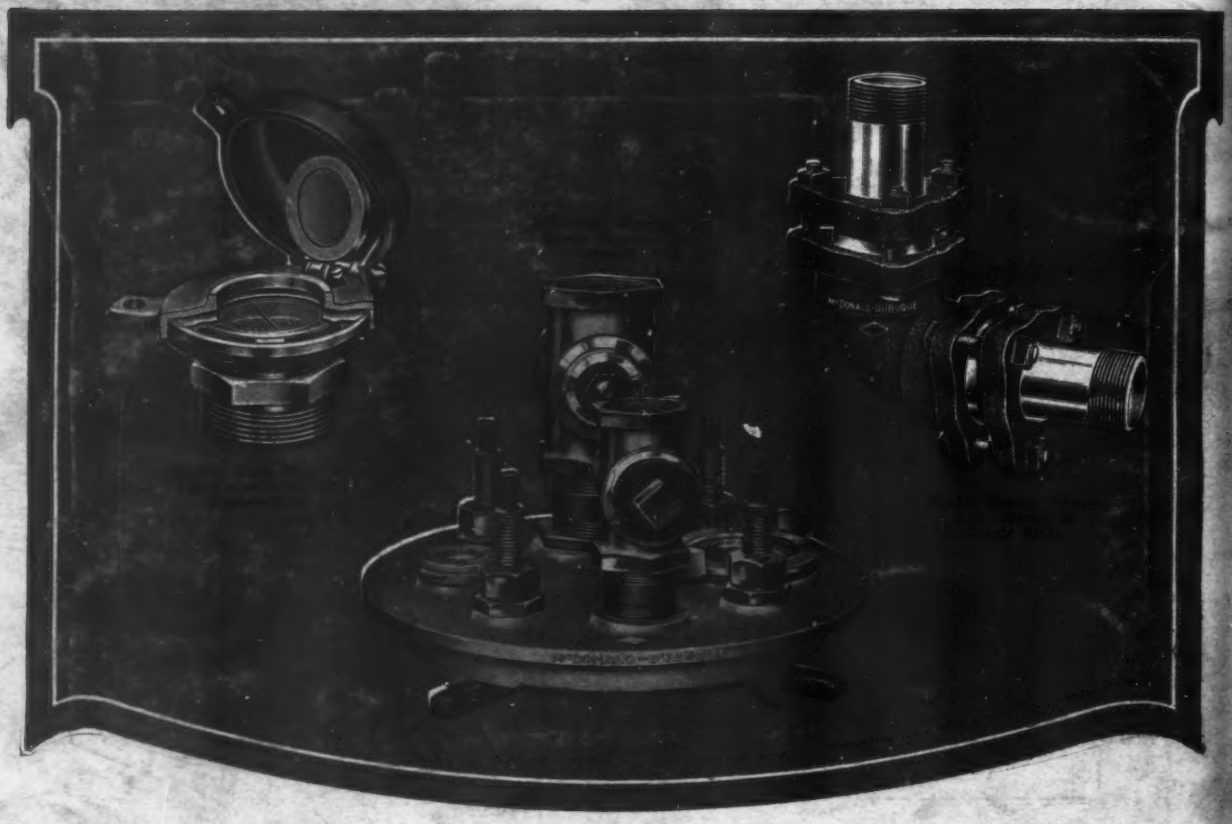
they say—

"Not too many triggers"

THE BESSEMER GAS ENGINE COMPANY
18 York Street ∴ ∴ Grove City, Pa.

BESSEMER

BESSEMER OIL FIELD ENGINES – COMPRESSORS – VACUUM PUMPS – ROLLER PUMPING POWERS



MATCHLESS DURABILITY

Most Economical in the Long Run

Swing Joints
Storage Tank Vents
Hand and Power Pumps
Pump Jacks
Tank Wagon Vents
All Kinds of Bulk Station
Oil Valves
Tank Car Unloading Apparatus
Metal Hose
Oil Bibbs
Pipe and Fittings
Curb Pump Swing Joints
Curb Pump Hose Nozzles
Foot Valves

A fixed determination that every McDONALD product shall render exceptional service lies back of every activity in the great McDonald plant. McDONALD products come to you, after exhaustive tests—mechanically perfect. They retain this perfection over surprisingly long periods of service. McDONALD Swing Joints, for example, remain tight in service several years before it is even necessary to repack them. The use of McDONALD Equipment means satisfactory service every day and economy in the long run. Test this statement by a trial.

"The Home of the Swing Joint"

A. Y. McDONALD MFG. CO.

Dubuque, Iowa

Omaha — Minneapolis — Des Moines

Complete stocks also carried by:
Butler Mfg. Co., Kansas City
Preferred Utilities Co., 53 W. 60th St., New York
U. S. Flexible Metallic Tubing Co., Los Angeles, San Francisco, Seattle